THE ORDERS OF ARCHITECTURE

FRANK HALSTEAD

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THE ORDERS OF ARCHITECTURE

BY FRANK HALSTEAD

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THE ORDERS OF ARCHITECTURE

BY

FRANK HALSTEAD

REGISTERED ARCHITECT

Instructor in Architectural Drawing, Wm. L. Dickinson High School,
Jersey City, N. J.

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PREFACE

During his sixteen years of teaching Architectural Drawing, the author has made the Classic Orders of Architecture the foundation upon which he has based his instruction. Finding that the plates, which, for the convenience of his students, he has made in blue-print form, are somewhat in demand by other teachers and architects, he now publishes them in this volume, adding such text matter as may be required by those not familiar with Architectural Drawing.

The present volume includes a discussion of classic moldings, column construction, and the Orders of Architecture. Together with the author's book on "Architectural Details" and his "Architects' and Builders' Reference Book," it is planned to meet the demand for a treatise on Architectural Drawing for the trade and vocational school, and to assist junior architects, carpenters, masons, and builders.

Explanations of the different orders of Architecture—Tuscan, Doric, Ionic, Corinthian, and Composite—have been published by many authors. The plates herein shown are not new, but their arrangement and the manner in which they are combined with the material of the text are the results of the author's experience as an instructor in Architectural Drawing, and as a registered architect, the material included being in actual use in his courses at Dickinson High School, Jersey City, N. J.

The author wishes to acknowledge gratefully the assistance given him by Mr. Frank E. Mathewson, Director of the Department of Technical Industrial and Special Trade Education of the Board of Education, Jersey City, Mr. Jacob A. Sieben, Instructor in Carpentry in Wm. L. Dickinson High School, Jersey City, and his colleagues, in the preparation of these books; and also the encouragement and inspiration of other friends whose names, for professional reasons, he is not at liberty to mention here.

Frank Halstead.

CONTENTS

PAGE
INTRODUCTION 1
CORNICE CONSTRUCTION 25
THE TUSCAN ORDER 41
THE DORIC ORDER 45
THE IONIC ORDER 55
THE CORINTHIAN ORDER 63
THE COMPOSITE ORDER 79
SUPERPOSITION 87
PEDESTALS 91
PARAPETS 95
BALUSTERS 95
ATTICS 95
PEDIMENTS 99
INTERCOLUMNIATION 103
PILASTERS 107
IMPOSTS 111
ARCHES 115
EGYPTIAN ARCHITECTURE 121
ANCIENT AND MODERN TERMS USED BY ARCHITECTS IN CONNECTION WITH THE ORDERS OF ARCHITECTURE 125
INDEX 137

ORDERS OF ARCHITECTURE

INTRODUCTION

An understanding of the Classic Orders of Architecture—Tuscan, Doric, Ionic, Corinthian, and Composite—is necessary for the student of Architectural Drawing. Therefore, a brief explanation will precede the detailed study of the problems.

The main parts of any building are the walls, roof, floors, doors, and windows.

There are many styles and kinds of roofs. In general, however, roofs may be classified as flat, sloping, and curved.. A roof that has only one slope is called a lean-to (see Plate 1, Fig. 1). If two sloping roofs lean against each other and rest upon parallel walls, they meet at the top in a horizontal edge, which is called the ridge (see Plate 1, Fig. 2), and form gables (see Plate 1, Fig. 2) at each end. Two roofs that rise from the same wall, but slope in opposite directions, form what is called a horizontal valley (see Plate 1, Fig. 3). If the roofs that rise from the four sides of a building slope inward at the same angle and meet at one point or edge, they form four inclined edges called hips (see Plate 1, Fig. 4). If two hip roofs meet they form another inclined edge, called a valley (see Plate 1, Fig. 5).

If a building consists of more than one story, each story is called a floor. If a roof extends beyond the walls that support it, the projection of the roof beyond the walls is called the eaves (see Plate 2, Fig. 1). A projection at the top of a wall is called a cornice (see Plate 2, Fig. 2). The upper or main part of the cornice, which projects beyond the lower part, is called the corona (see Plate 2, Fig. 3). Every wall has what is called a footing, which is wider than the wall above so as to give it a better foundation (see Plate 2, Fig. 4). A footing is also called a base, but the term base is more frequently applied to the lower part of a column.

A small projection at the top of a wall or column is called a capital (see Plate 3, Fig. 1); a larger one, as stated on page 9, is called a cornice. A small projecting portion of a wall, extending from top to bottom, and as long as it is thick, is called a post (see Plate 3, Fig. 2) or, if it supports anything, a die (see Plate 3, Fig. 3).

A high post is called a pier if it is square, or a column if it is round. The part of a pier or column between the capital, or enlarged upper part, and the base is called the shaft. The flat upper part of the capital is the abacus (see Plate 3, Fig. 4). A beam that goes across or spans the space between two piers or columns, or between a pier or column and a wall, is called an architrave, or epistyle (see Plate 3, Fig. 4). Between the architrave and the cornice is a small strip of wall which is called the frieze (see Plate 3, Fig. 4).

A row of columns is called a colonnade (see Plate 4, Fig. 1). The space between piers or columns, if curved, is called an arch, and a series of arches is called an arcade (see Plate 4, Fig. 2).

The architrave, frieze, and cornice together constitute the entablature (see Plate 5, Fig. 1). If the space between two parallel walls is covered by a continuous curved roof, it is called a vault (see Plate 5, Fig. 2). The under surface of a beam or architrave is called the soffit; and the under surface of an arch or vault, the intrados. The upper surface of an arch is called the extrados (see Plate 5, Fig. 2). The portion of the wall immediately above the extrados of an arch (see Plate 5, Fig. 2), is called a spandrel.

The chief supporting members of a building are the walls, piers, and columns, with or without pedestals; while the roof, frieze, and cornice constitute the load carried. The architrave, arches, and spandrels form part of the load, but are also supporting members of the walls above them.

A building, besides being a shelter, can also be made artistic, by the use of good proportions and details. These can be worked out by means of a knowledge of the rules of proportion and design used in the Classic Orders of Architecture, and by a study of general architectural design.

The Orders of Architecture originated in Greece, and their proportions and designs are the foundation of modern architecture and construction, thereby proving the Greeks masters in this art.

Since the degree of civilization of any country may be determined by a study of its architectural remains, the progress of Greek wealth and learning and the advancement of painting and sculpture may be traced in the development of the Doric temple from the crude form in which it appears in the eighth century B.C. to the ideal proportions and extreme refinement which characterize it in the classic period. The Doric temple is mentioned in this connection because the Doric was the chief order in Greece in the eighth century. It is also the simplest of the Greek orders. No one in the succeeding ages has ever built a better Doric exterior than did the Greeks when they constructed the Parthenon on the Acropolis at Athens.

There were, of course, older temples than the Parthenon. Many, however, have completely disappeared; some have been overturned by earthquakes, so that nothing is left of them but heaps of stones, while others have only recently been uncovered by excavation. In these, so little of the foundation and parts of the columns has been discovered that their restoration is difficult.

The Parthenon and the Erechtheum are, fortunately, comparatively unharmed, and the restoration of their columns, entablatures, and walls is being accomplished. There is, however, no agreement among archeologists concerning their roofing or lighting. Another temple, that of Apollo Epikourios, at Bassæ, is one of the finest examples of monumental effect, yet it is utterly baffling in the arrangement of its interior columns, roof construction, and exterior lighting.

We do not know how any of the Greek temples were lighted. The generally accepted theory is that light filtered through openings in the roof, such as are shown in models of the Parthenon. Yet this seems unlikely, for if such openings existed, the interior statues, paintings, and decorations would have been partially exposed to the weather. Moreover, the broken ridges necessary to form the openings would have been unsightly from the exterior, unless they were exceedingly small, in which case, of course, little light would be admitted.

Since the Greeks lived mostly outdoors, they considered the design of the interior of their buildings of less importance than that of the exterior. For this reason a typical Greek temple, without its exterior columns, would be nothing but four walls with little or no architectural decoration.

In the detailed study of the orders which follows, the elements that are common to all will be explained and the distinguishing features of each order will be stated.

The term "order" denotes a distinctive method of proportioning and decorating a column and its entablature. Every column must have a capital, a shaft, and a base, with or without a pedestal; and each of these parts must show the characteristics of the order to which the column belongs.

There are five orders: Tuscan, Doric, Ionic, Corinthian, and Composite. The Doric Order includes different styles, one type of Doric being found in Sicily and Italy, and one in Assyria and Persia. The Romans designed a simplified Tuscan, which is also called Doric.

Various moldings are employed in the Greek and Roman orders. The curves of all these moldings are constructed from conic sections and the intersections of arcs of circles. The geometrical construction of moldings is illustrated in Plate 6.

The Greek moldings are shown in Plate 7. They are divided into three classes, as follows:

1. Those composed of a single curve, e.g., ovolo, echinus, or quarter-round.
2. Those composed of two curves, e.g., cyma-reversa and cyma-recta.
3. Those made up of three curves and composed of arcs of circles combined with arcs of ellipses, such as the bird's-beak.

The Roman moldings, as shown in Plate 8, are always made from the arcs of a circle or of two tangent circles. For this reason the Roman moldings lack the refinement and delicacy of the Greek.

The classic moldings shown in Plates 9 and 10 have been designed from the eight regular moldings found in the remains of buildings of the classic period. These moldings are as follows:

1. Annulet, band, cincture, fillet, listel, or square.
2. Torus, or tore.

3. Astragal, or bead.
4. Scotia, trochilus, or mouth.
5. Ovolo, quarter-round, or echinus.
6. Cavetto, cove, or hollow.
7. Cymatium, or cyma-recta.
8. Inverted cymatium, or cyma-reversa.

None of these moldings belongs exclusively to any one order, and each of them may occupy various positions in an assemblage of moldings.

Plate 1.

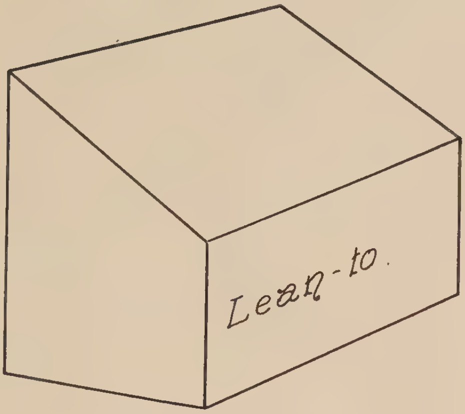


Fig. 1

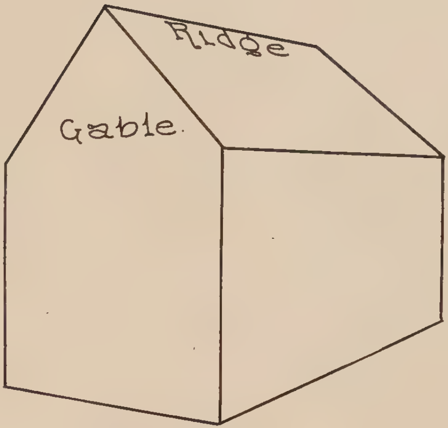


Fig. 2

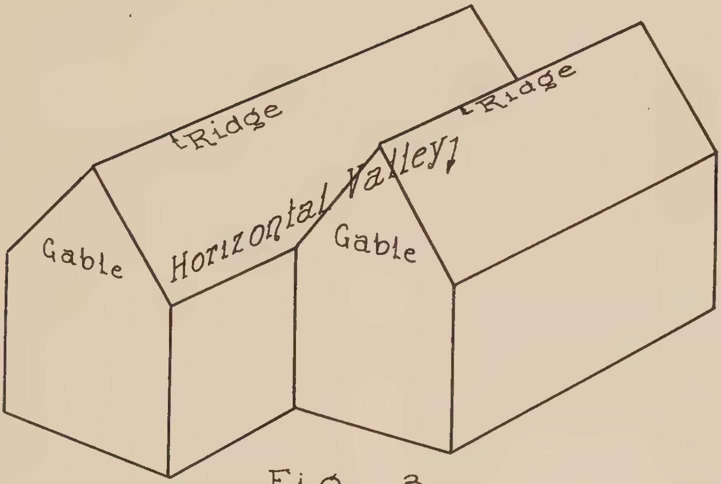


Fig. 3

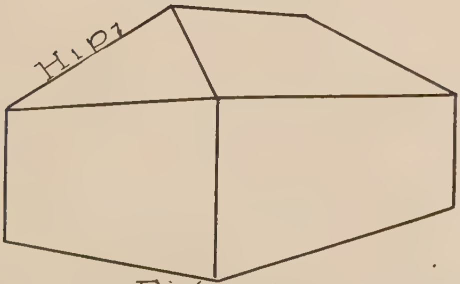


Fig.- 4

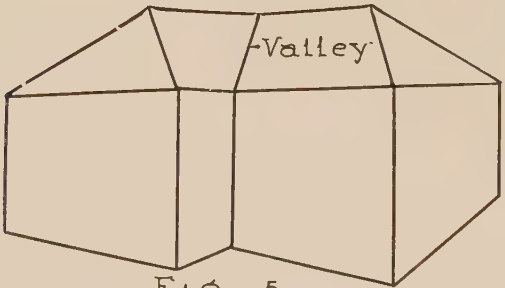


Fig. 5

Plate 2

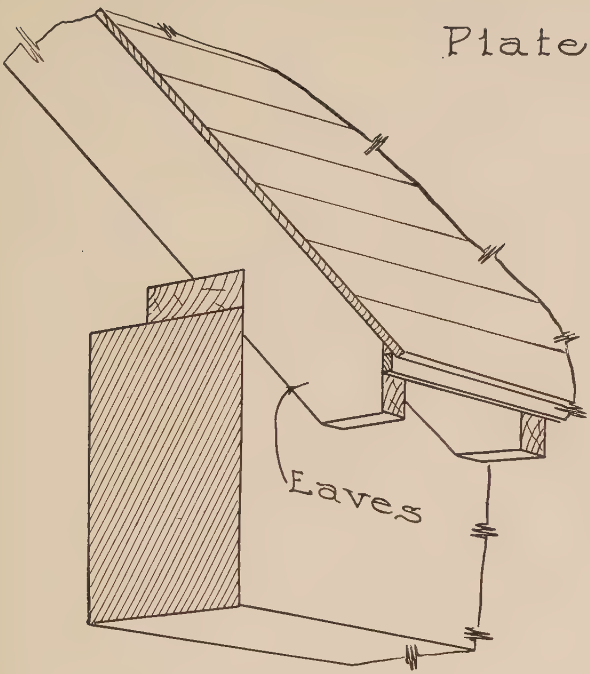


Fig. 1.

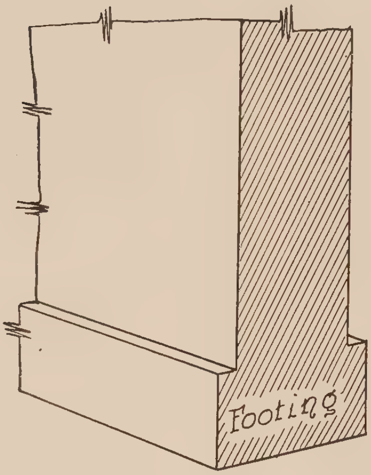


Fig. 4.

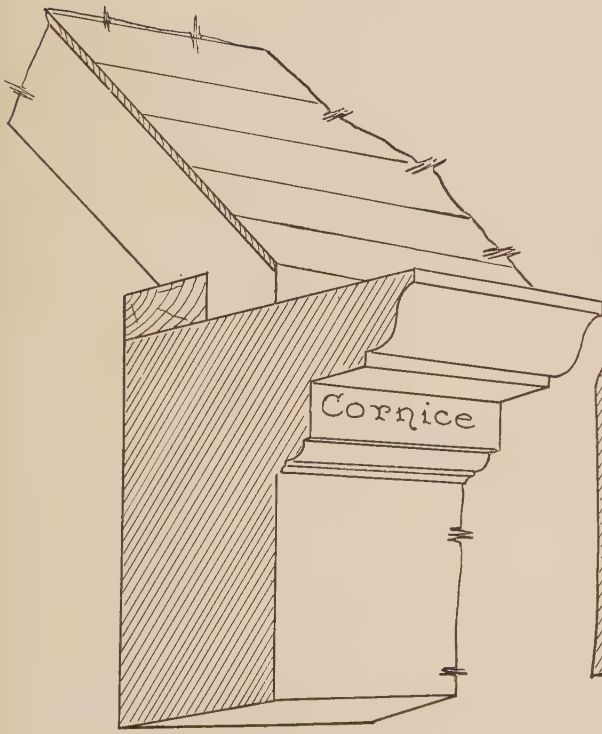


Fig. 2.

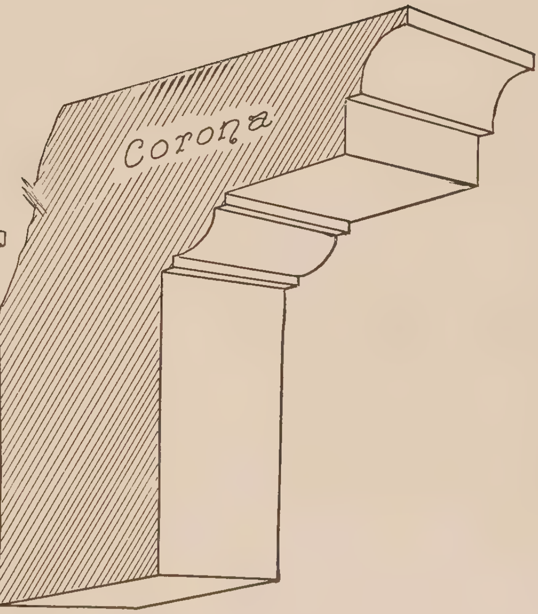


Fig. 3.

Dwn. E. Lewis

Plate 3

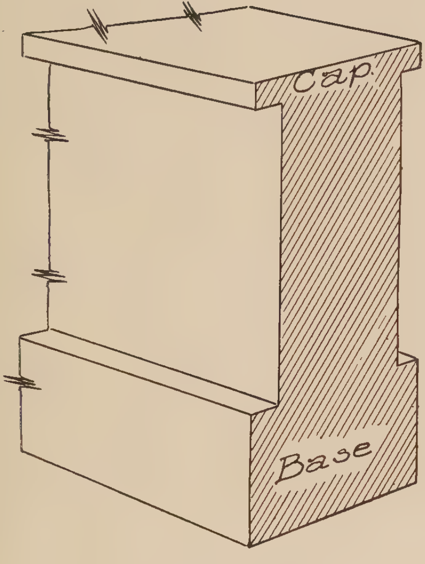


Fig. 1.

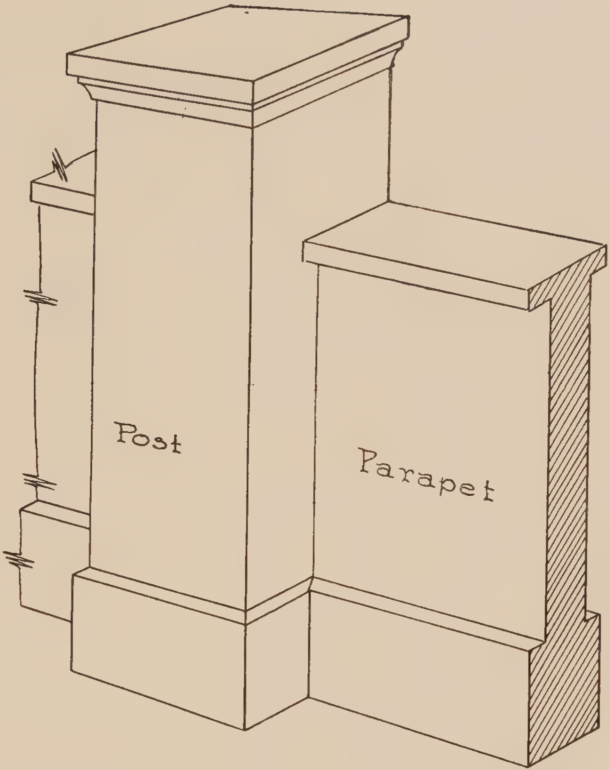


Fig. 2

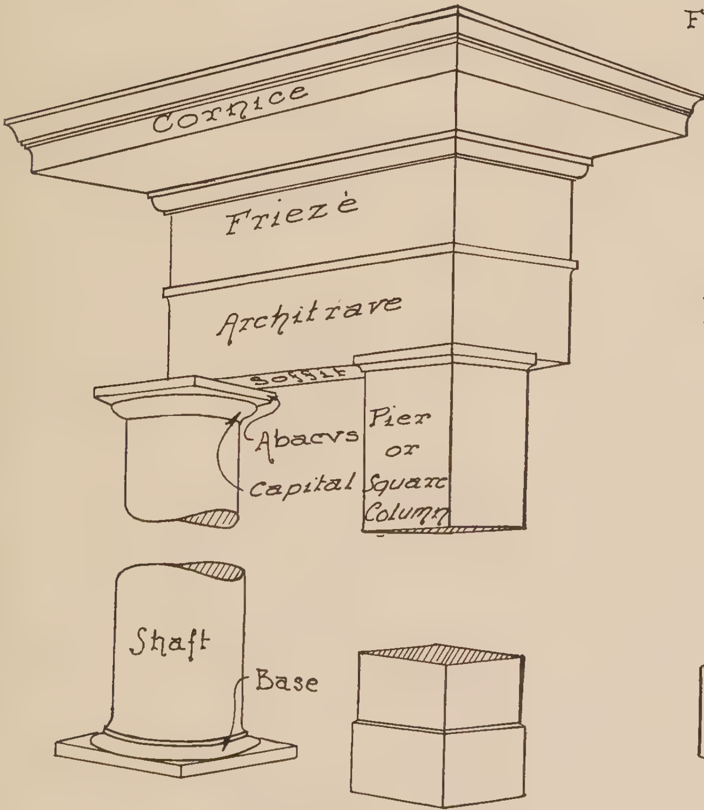


Fig. 4

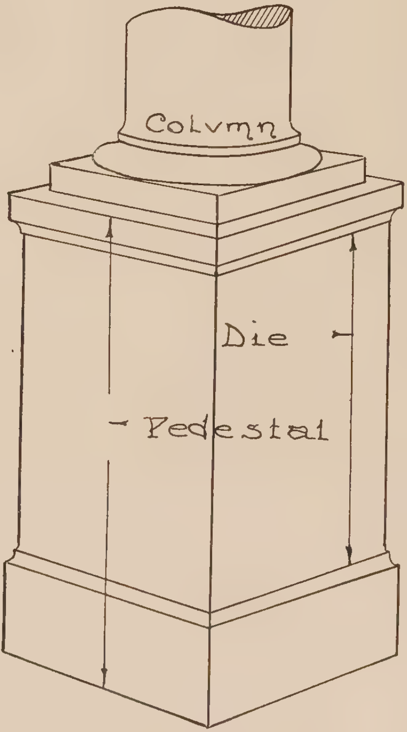


Fig. 3

Plate 4

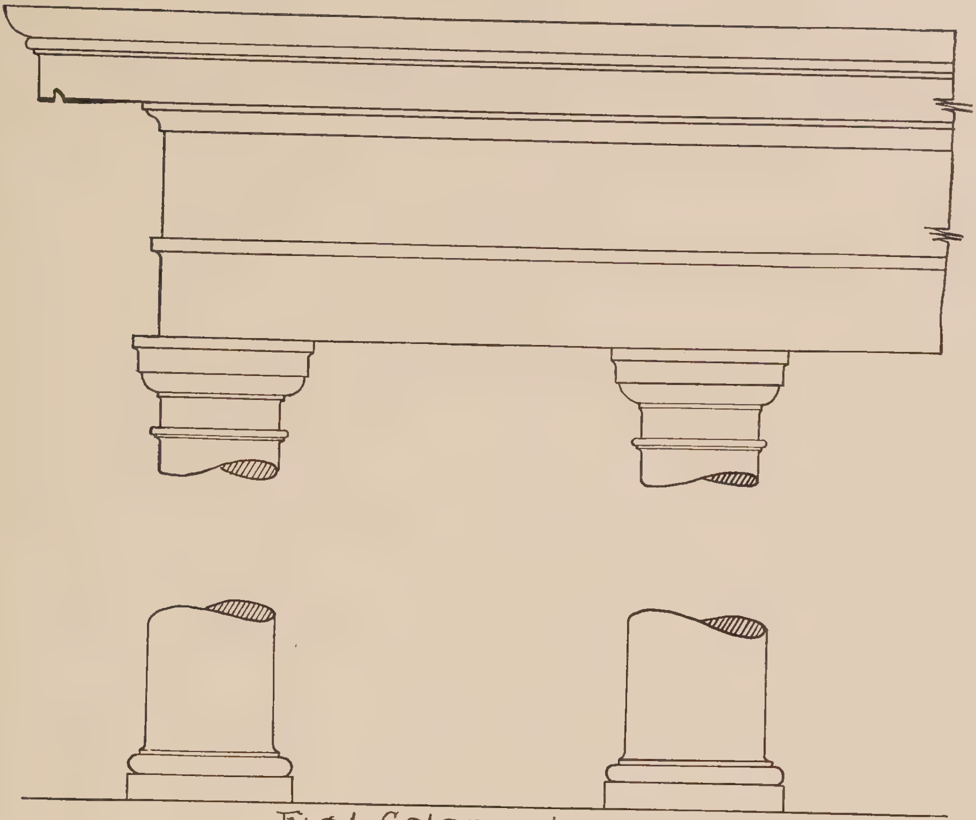


Fig 1. Colonnade

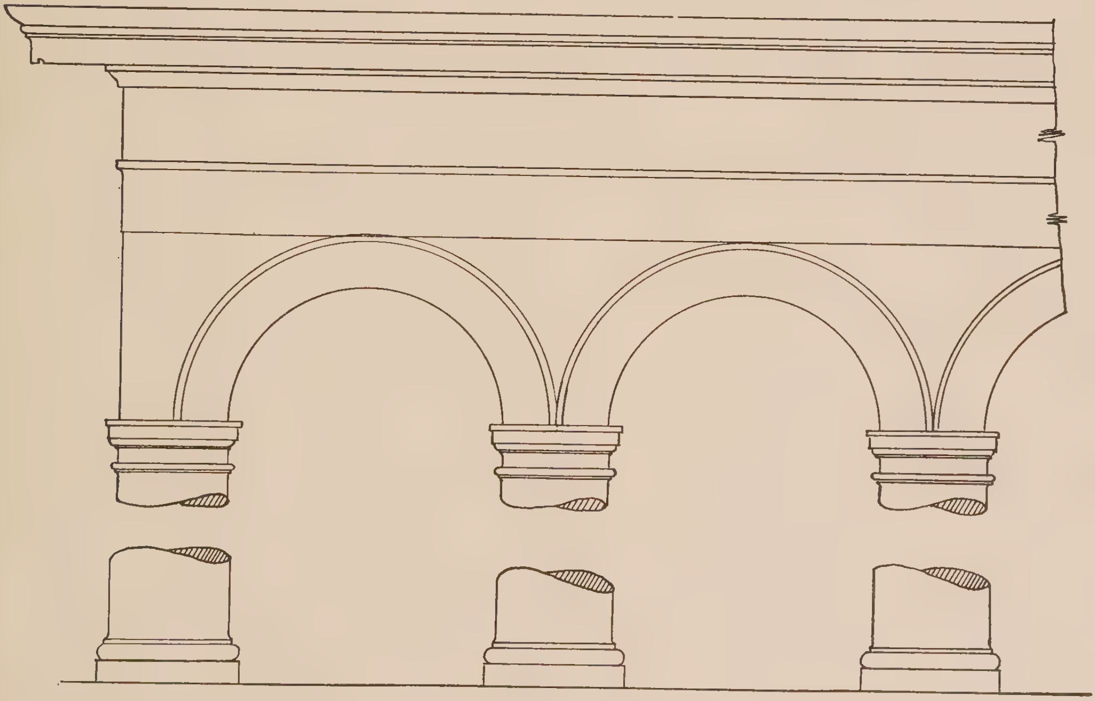


Fig. 2. Arcade

Plate 5

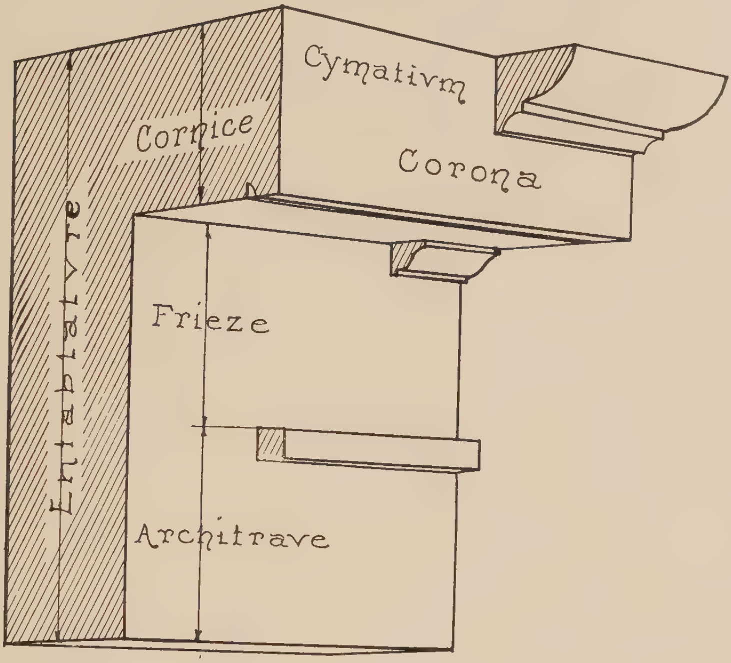


Fig. 1

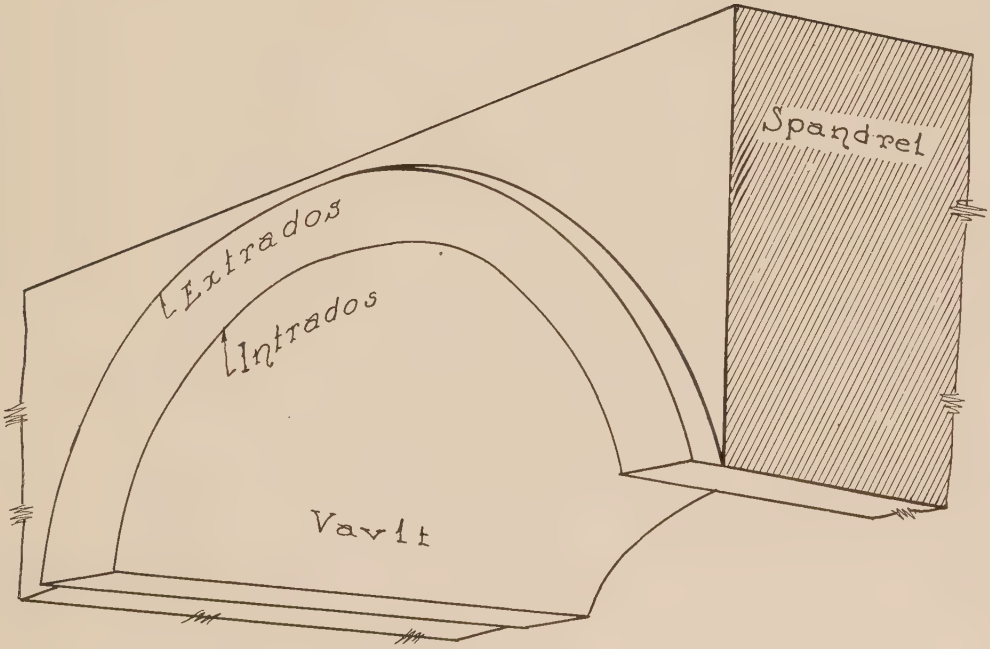
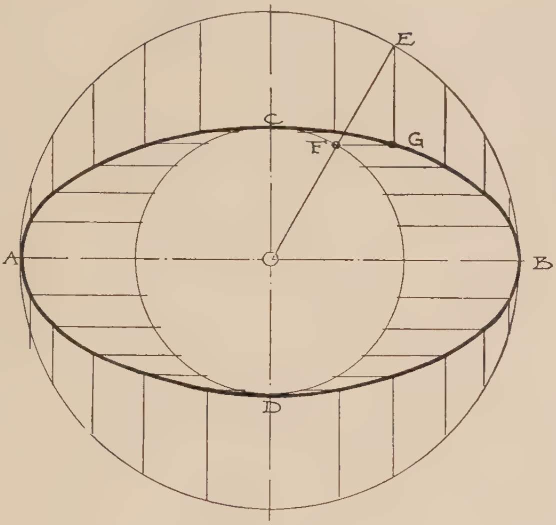


Fig. 2

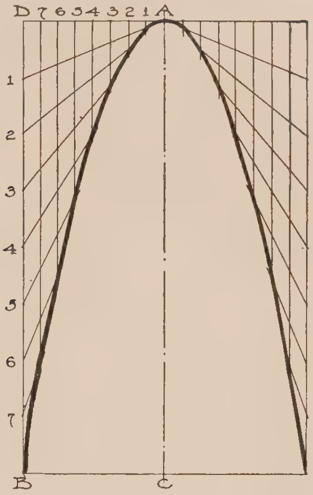
Geometrical Problems
Plate 6

Ellipse.



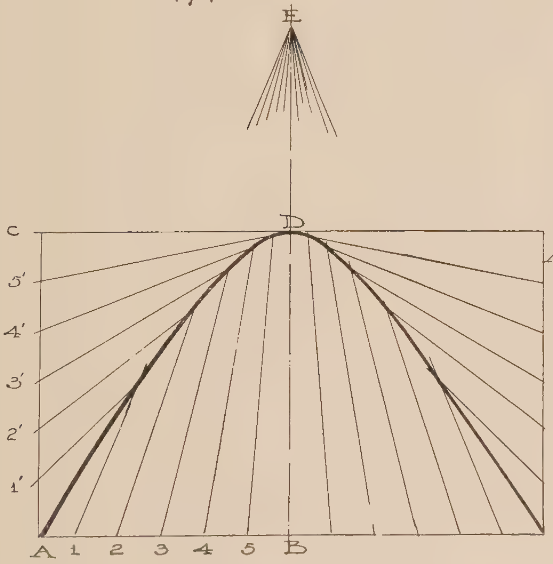
Draw circles whose diameters are eqval to AB and CD From center O draw any line as OE From F where the line cvts the inner circle, draw FG parallel to axis AB from E Draw EG parallel to axis CO

Parabola



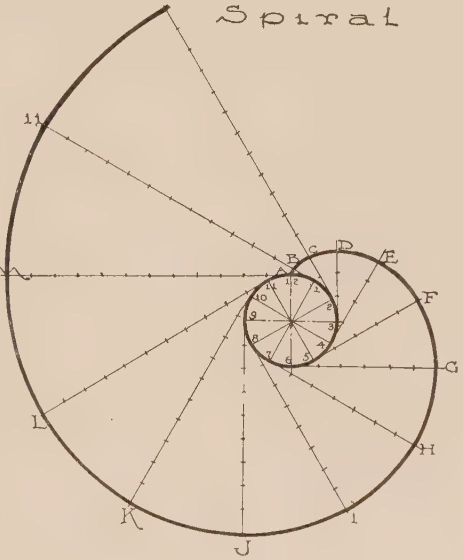
Draw rectangle ABCD. Divide AD and DB into same nvmber of eqval parts. From 1,2,3,etc. on DB draw lines to A. From 1,2,3,etc. on AD draw lines parallel to AC

Hyperbola



Draw rectangle ABCD.- Divide AC and AB into the same nvmber of eqval parts Extend BD to any point as E Join 1.2.3 4 etc to D and 1 2.3.etc to E connect points of intersection.

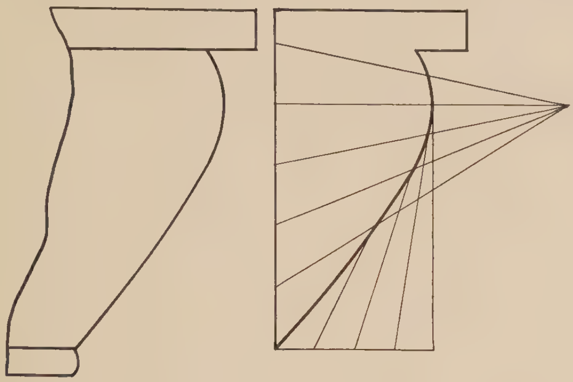
Spiral



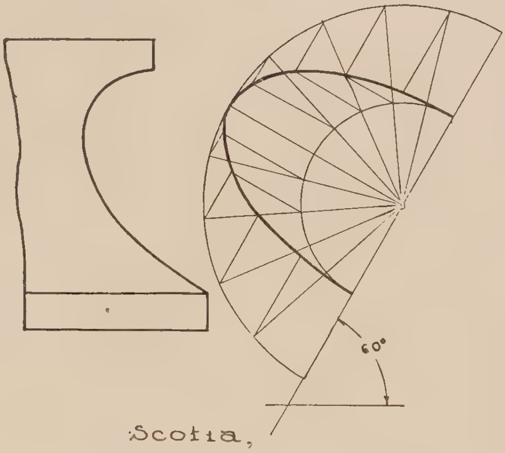
Divide given circle into any nvmbe of eqval parts, as, 1 2 3 etc and at each point draw a tangent to the circle Lay off the chord 2-1 on tangent 1-B, twice 2-1 on 2-C three time 2-1 on 3 De

Greek Moldings.

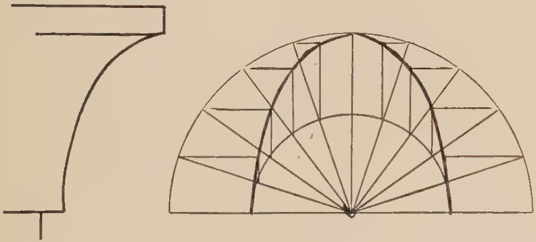
Plate 7



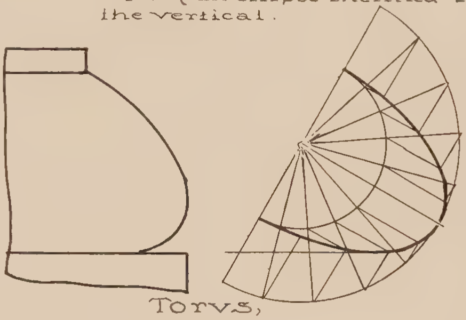
Ovolo, Echinus, or Quarter-round,
Constructed by using the Hyperbola.



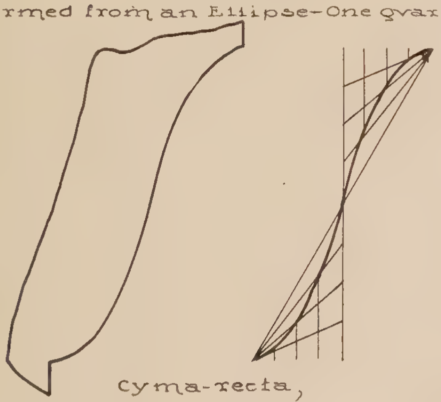
Scotia,
Constructed from an ellipse inclined to the vertical.



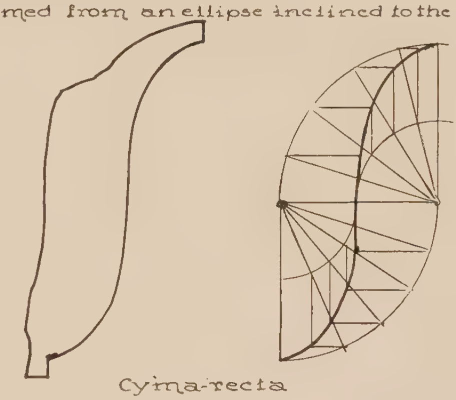
Cavetto or Cove,
Formed from an Ellipse—One quarter turn



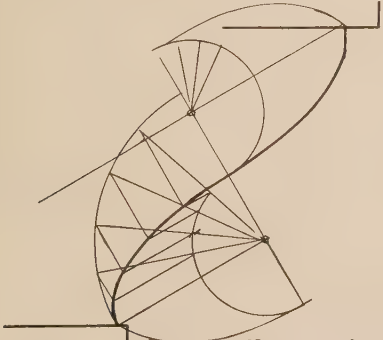
Torus,
Formed from an ellipse inclined to the vertical



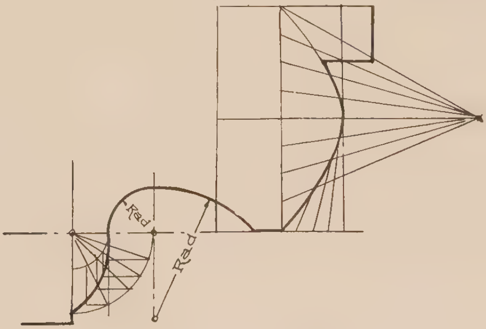
Cyma-recta,
Constructed from two arcs of a parabola.



Cyma-recta
Constructed from two reversed arcs of an ellipse.

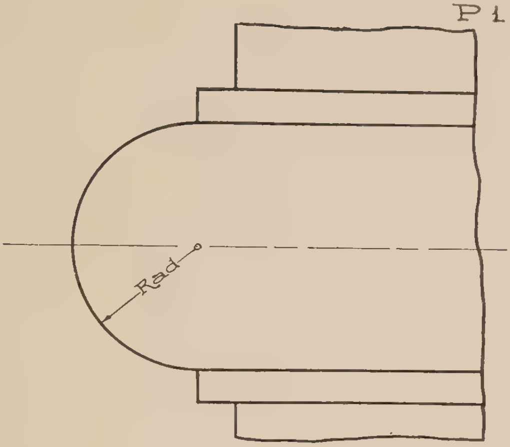


Cyma-reversa,
Formed by two reversed elliptic arcs.

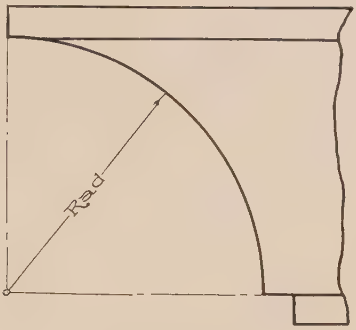


Bird's beak,
Constructed from an hyperbola and Ellipse.

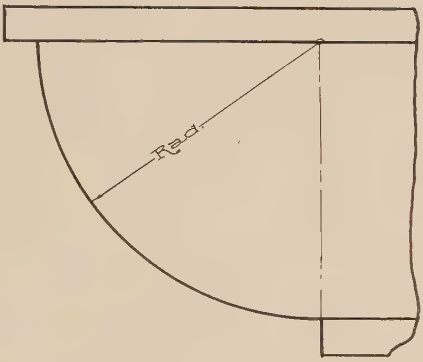
Roman Moldings
Plate 8



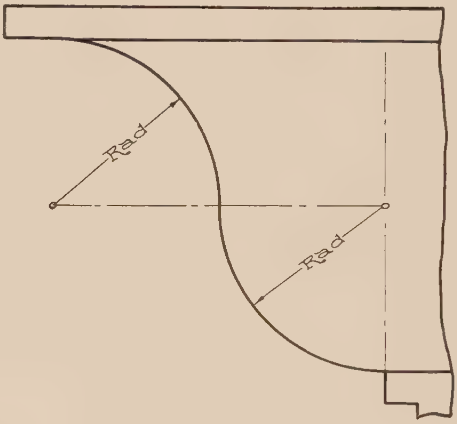
Torvs



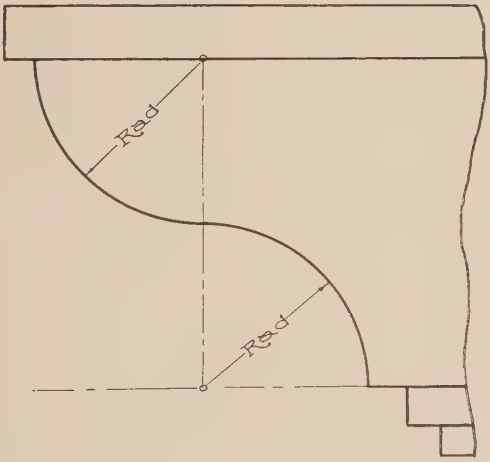
Cavetto



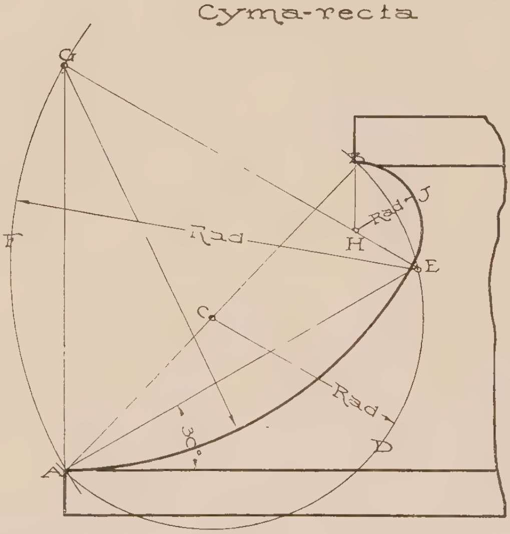
Ovolo.



Cyma-recta



Cyma- reversa



Scotia- Points A and B Given.
See notes for construction.

Colvmn Constrvction

Molding Details

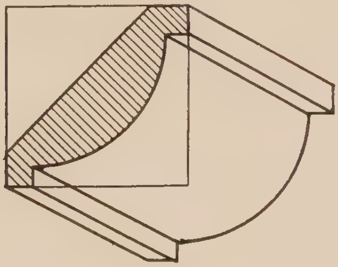
Plate — 9

1 - Constrvct in vpper half of drawing paper a Parabola and an Hyperbola where the coordinates are $1\frac{1}{2}$ in and $\frac{7}{8}$ in. also an ellipse whose major axis is 5 in. and the minor axis $2\frac{1}{2}$ in. and a spiral of $1\frac{1}{2}$ revolvtions, the small circle of which is $\frac{1}{2}$ in in diameter

Note-See detail plate on the above constrvction.

2.-Constrvct in lower half of paper the different moldings in isometric.- Trve shape in front view, and sides vanishing to the right as per sketch below.

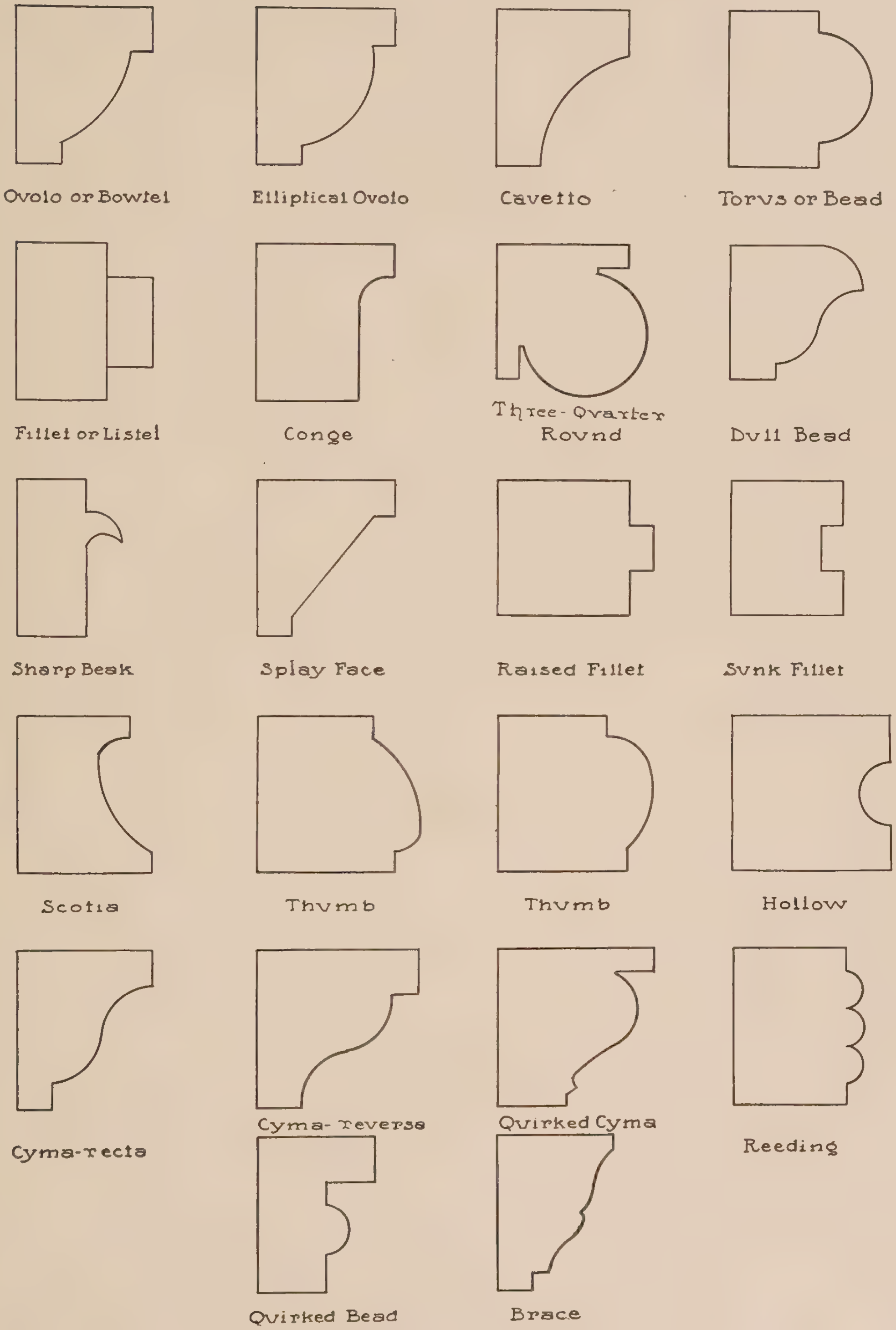
Note See data plates on the constrvction and details of moldings.



Note: Stvdents mvst vse their own jvdgment as to size of above moldings.

Classic Moldings.

Plate 10



CORNICE CONSTRUCTION

Cornices.—(See Plate 11.) In the Tuscan, Doric, and Ionic Orders, the cornice is divided into four equal parts. In the discussion that follows, the highest of these parts is called the first quarter, and the lowest the fourth quarter. The ovolo molding is used in the first quarter of the Tuscan cornice; a corona, bead, or fillet molding in the second quarter; and a bed molding in the fourth; the third quarter is plain in design.

In the Doric Order, a cavetto molding is used in the first quarter of the cornice; a corona or small cyma-reversa in the second; the mutules or dentils, as shown in Plate 12, in the third; and a bed molding with triglyphs in the fourth.

In the Ionic Order, there is a cyma-rectra molding in the first quarter and a bed molding in the second; the dentils are used in the third, and a bed molding in the fourth.

In the Corinthian Order, the divisions are five in number. In the first, the cyma-recta molding is used; in the second, a bed molding; in the third, the modillions; in the fourth, the dentils; and in the fifth, a cyma-reversa molding.

The projection of the cornice in all the orders is governed by the angle it makes with the column, as shown by the dotted line *A* (Plate 11). If a 45° line is drawn from the abacus at the center line of the column to the top edge of the architrave, it will give the exact projection of the cornice. In the Doric Order this line gives the exact projection of the tænia; and if a similar line at the same angle is drawn from the same point of the upper edge of the frieze to the bottom edge of the architrave, it will give the axis of the triglyphs. Again, if a similar line is drawn from the intersection of the projection of the upper diameter of the column with the top edge of the frieze, to the top edge of the cornice, it will show the projection of the corona (see Plate 11).

Dentils.—(See Plate 12.) In constructing the orders in which dentils are used, it is advisable to draw first the dentil over the axis of the column. The intermediate dentils are then drawn, the exact number being determined by the order that is being drawn. The space between two dentils is called an interdentil (see Plate 12), its width being one-half the width of the dentil in each case.

Modillions.—(See Plate 12.) Modillions are used in the Corinthian and Composite Orders. In the Corinthian Order a modillion projects over the axis of the corner column, and another one over the entire face of the double dentil. In the Composite Order, there is one modillion over the axis of the column, and the double modillion projects from the corner, with its inner face in line with the face of the frieze below.

In drawing a modillion, it is advisable to draw first the general outline; then a semi-circle, half the height of the modillion, at one end; and a full circle, equal to its total height, at the other end. The outer and inner rosettes should then be constructed, one rosette being twice as large as the other. By connecting these rosettes with the required curves and circles, the modillion is completed.

Architraves.—(See Plate 13.) In the Tuscan Order, the architrave consists of one fascia, or band. In the Doric, it has two or three. The architrave of the Corinthian consists of two fascias. In all cases, the lowest band is the narrowest, and is generally drawn in line with the face of the shaft below and the frieze above.

All architraves have a cymatium for a crowning member. In the Tuscan and Doric Orders this consists of a broad fillet called the tænia. In the Corinthian and Ionic Orders it has a large cyma-recta molding crowned with a large fillet.

Tænia.—(See Plate 13.) The tænia of the Tuscan Order has a conge molding underneath, while that of the Doric Order has a narrow fillet which is sometimes beveled and is called a regula.

Capitals and Bases.—(See Plate 14.) The heights of the capitals of the orders are in proportion to the base diameters. The height of a capital is divided into three parts, each part being divided and subdivided so as to give the heights of the special moldings.

The height of the base of each order is approximately half the diameter of the base of the shaft of the column, except in the Tuscan Order where it is less than half.

The square plinths of the bases of the columns are all of a height equal to one-third of the diameter of the base of the shaft of the column.

The Denticulated Doric has three fillets.

Bead and Fillet.—(See Plate 14.) The astragal of the column, in the Tuscan and Doric Orders, is in height one-sixteenth of the diameter of the base of the column, while in the Ionic and Corinthian Orders it is one-sixth of the base diameter in height.

In the Ionic Order the top of the eye, or center, of the volute comes in line with the top of the astragal, and the volute should make three perfect revolutions, finishing tangent to the upper part of the eye (see Plate 14).

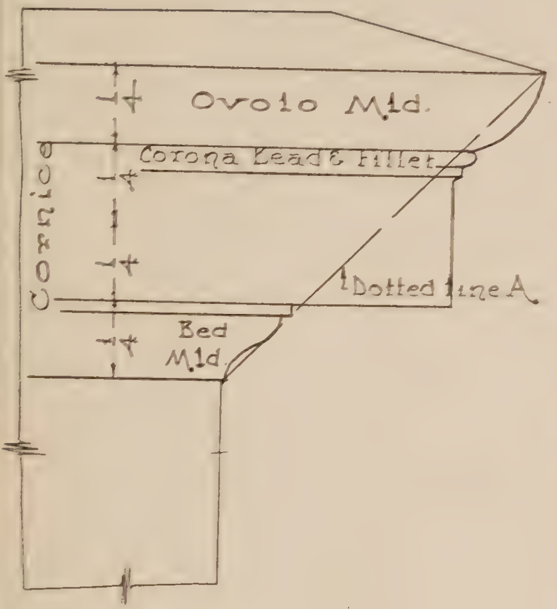
Column and Volute Construction.—(See Plate 15.) The shaft of a column is straight throughout the lowest third of its height and diminishes in diameter in the upper two-thirds. The outline is curved, the curve being constructed by passing cutting planes, as shown in Plate 15. This curved part of the column is called the entasis.

The volutes, or scrolls, which are the most conspicuous and distinctive feature of the Ionic Order, are also shown in Plate 15. The eye, or center, of the volute is one-sixteenth of the base diameter of the shaft. It has no structural significance, and is a purely decorative feature, derived from Assyria and Egypt.

The placement of all the moldings, parts, etc., of a column is shown in Plate 16. It will be of great assistance to the student to make a copy of this plate, so as to become better acquainted with the parts of a column. Plate 17 should be used for reference as to dimensions and proportions.

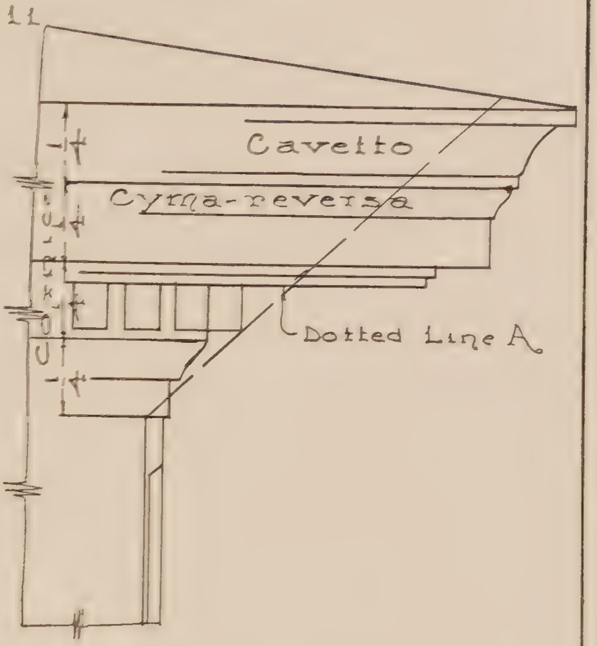
Cornices

Plate 11



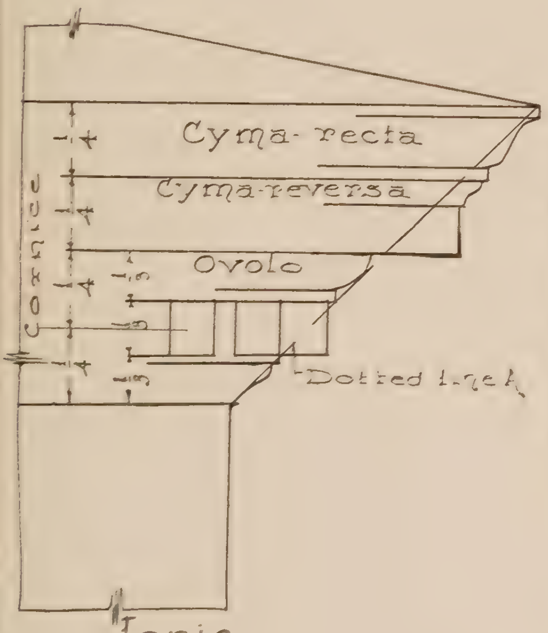
Tvscan

Fig 1.



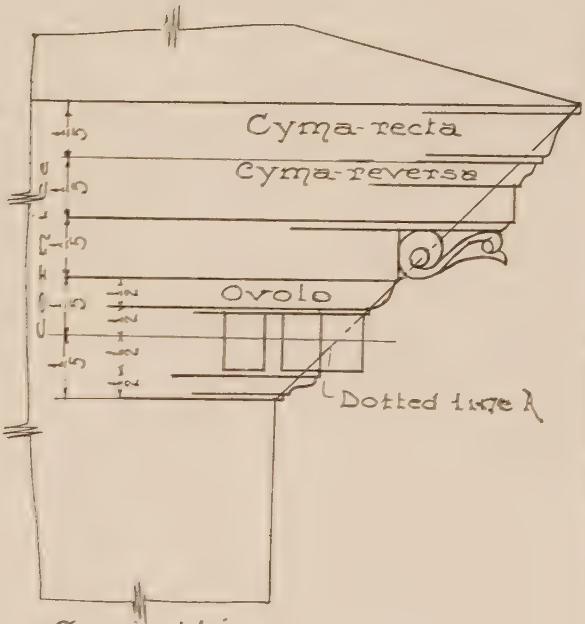
Doric

Fig 2



Ionic.

Fig 3



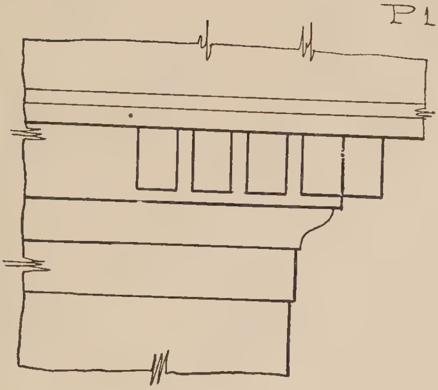
Corinthian

Fig 4

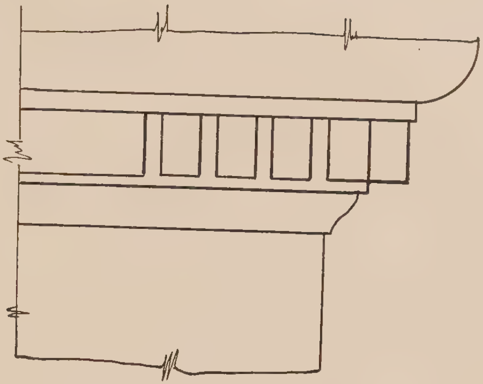
E. Lewis

DENTILS.

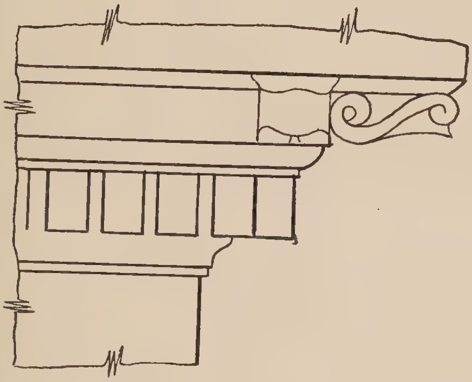
Plate 12



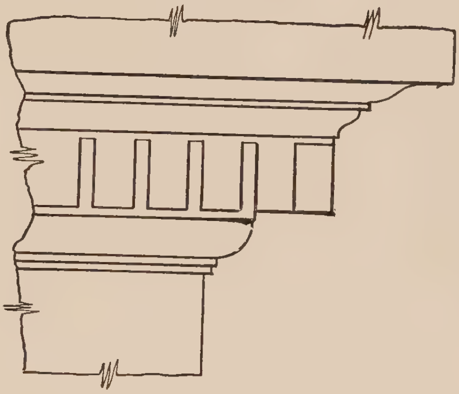
Doric
Fig. 1



Ionic
Fig. 2.

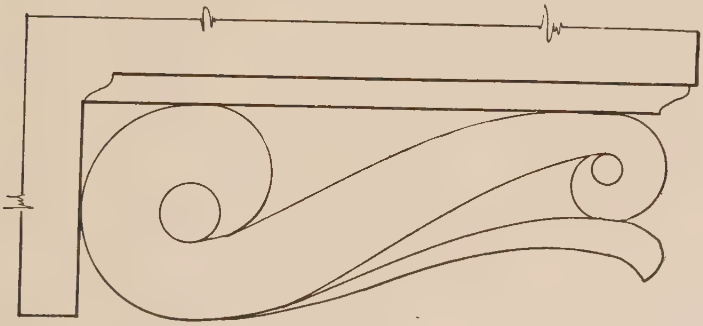


Corinthian
Fig 3



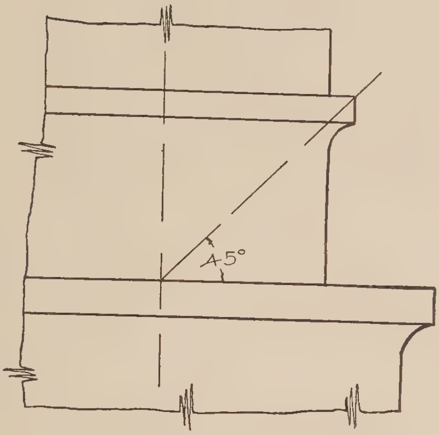
Composite
Fig 4

MODILLIONS.

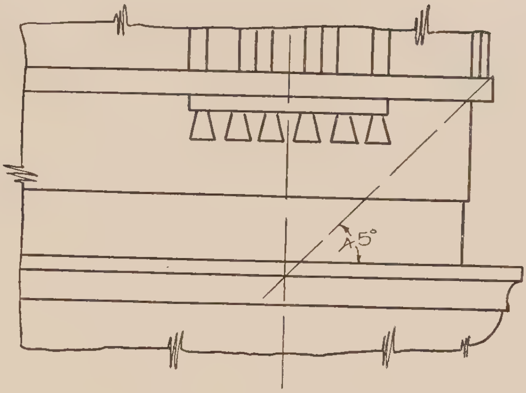


ARCHITRAVES

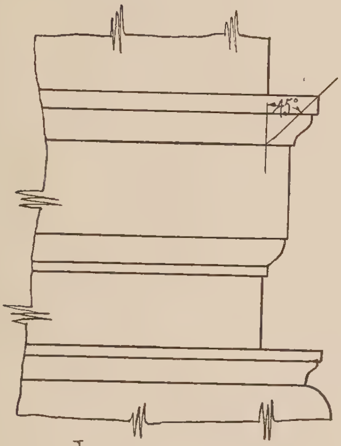
Plate 13



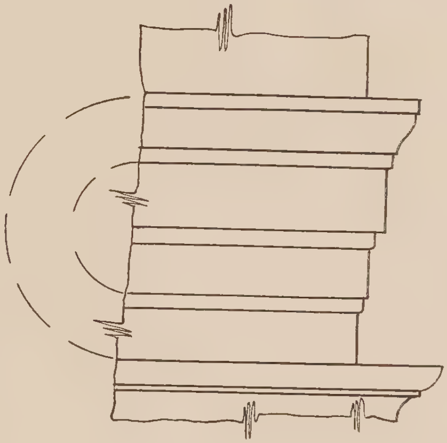
TVSCAN



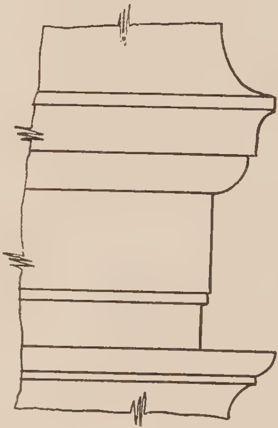
DORIC



IONIC

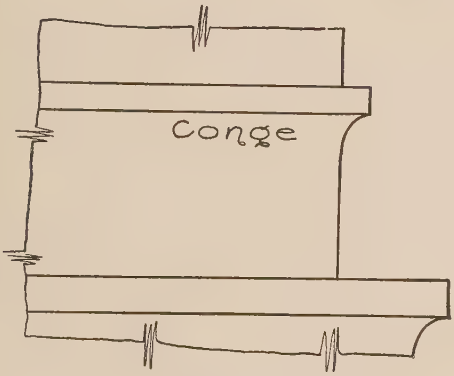


CORINTHIAN

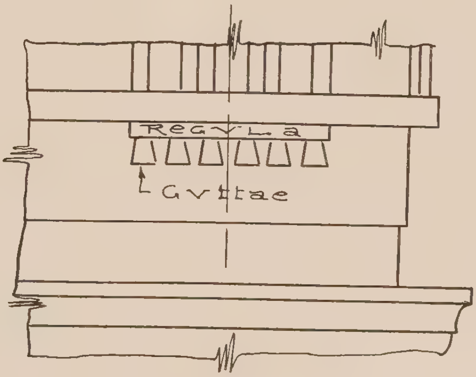


COMPOSITE

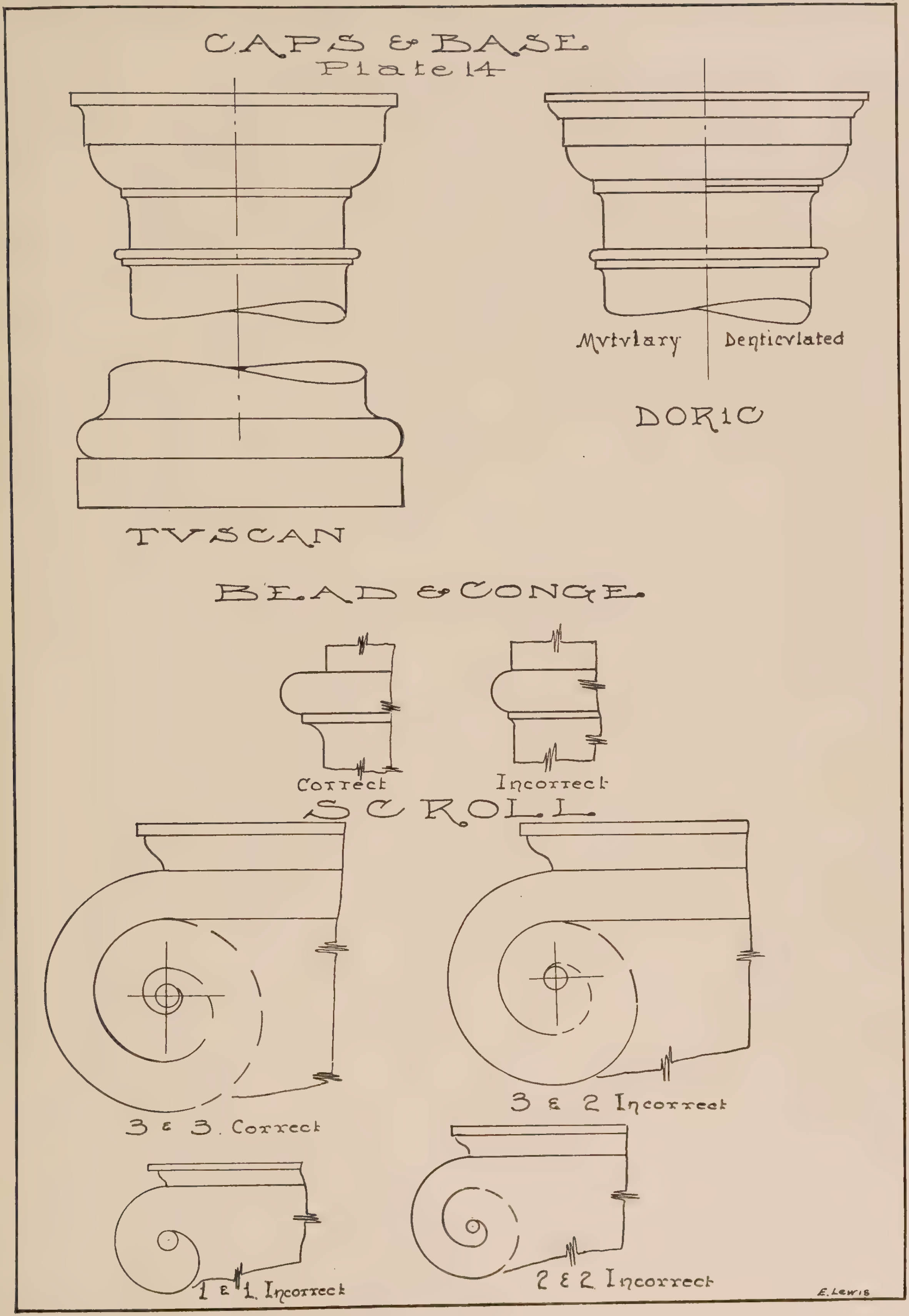
TAENIA

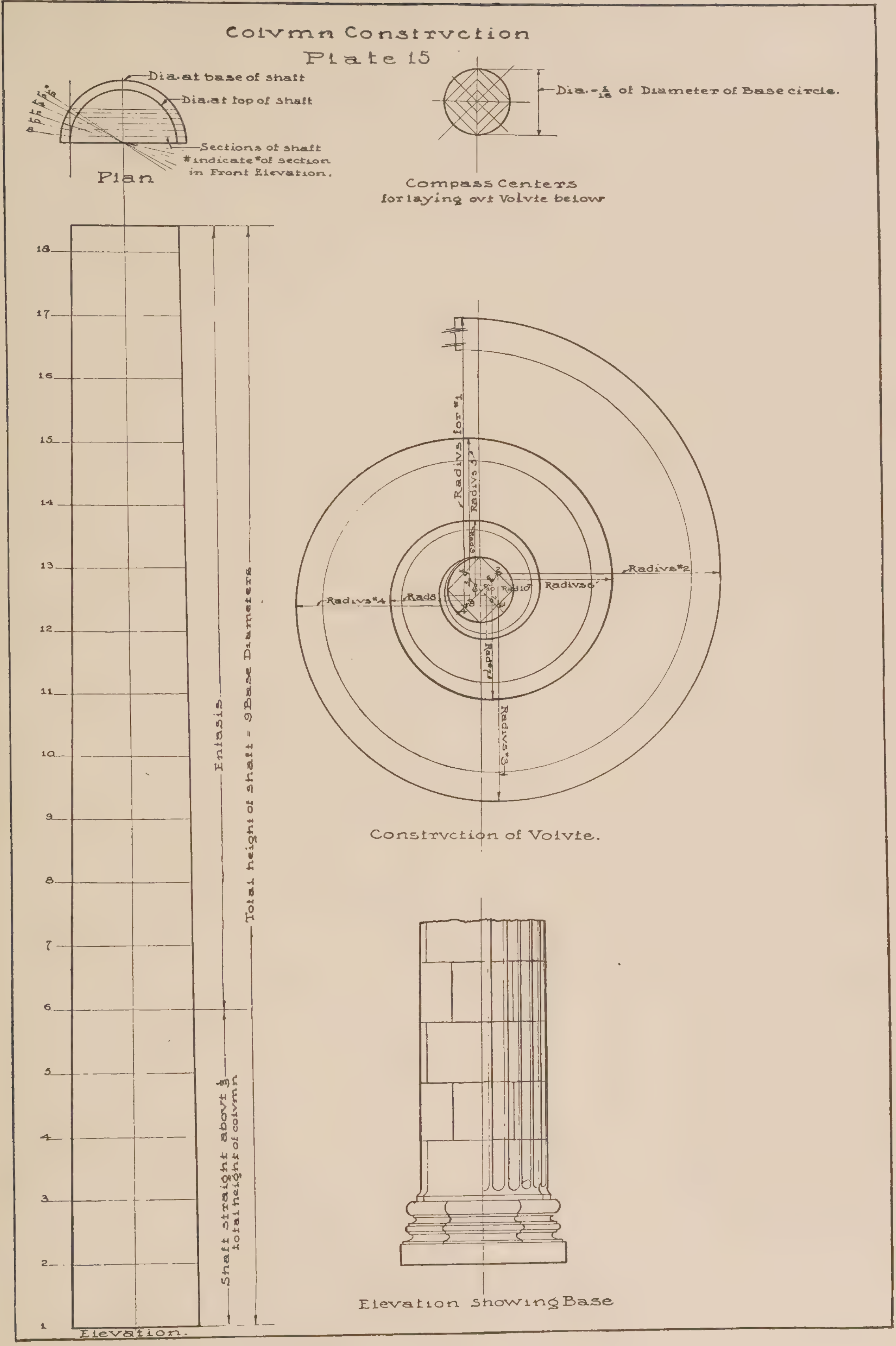


TVSCAN

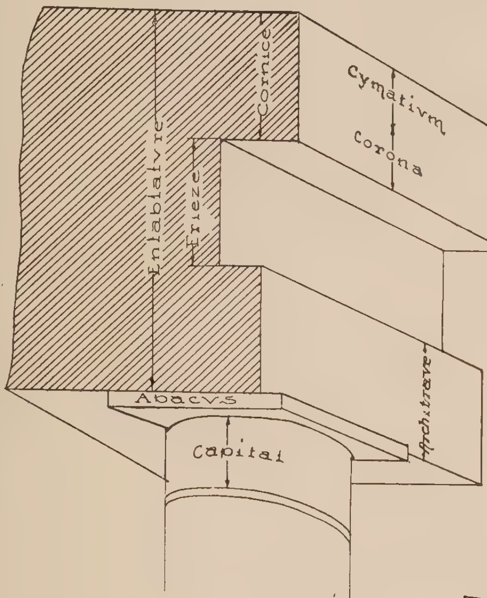


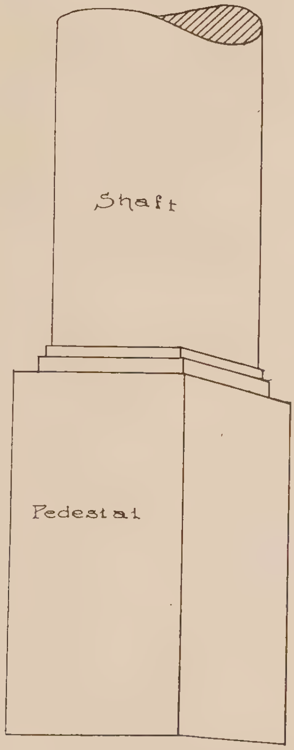
DORIC


CAPS & BASE
Plate 14
Mvtvlary
Denticvlated
DORIC
TVSCAN
BEAD & CONGE
Correct
Incorrect
SCROLL
3 & 3. Correct
3 & 2 Incorrect
1 & 1. Incorrect
2 & 2 Incorrect
E. Lewis


Column Construction
Plate 15
Dia. at base of shaft
Dia. at top of shaft
Sections of shaft
# indicate # of section in Front Elevation.
Plan
Dia. = 1/18 of Diameter of Base circle.
Compass Centers for laying out Volute below
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
Entasis
Total height of shaft = 9 Base Diameters
Shaft straight about 1/3 total height of column
Elevation.
Radius for #1
Radius 5
Rad 9
Radius #2
Radius 6
Rad 10
Radius #4
Rad 8
Rad 7
Radius #3
Construction of Volute.
Elevation Showing Base

Reference Drawing
for
Plate 16
Column Construction





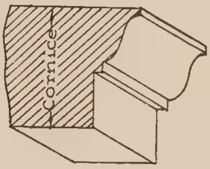


Fig. 1

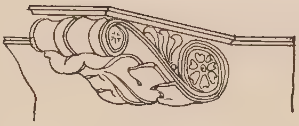


Fig. 4

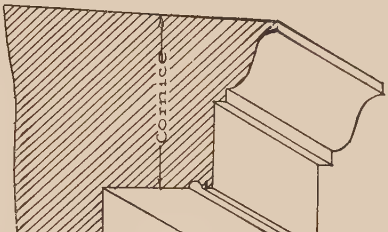


Fig. 3.

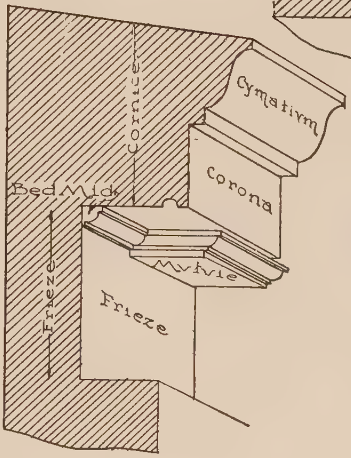


Fig. 2

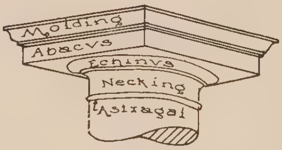


Fig 7

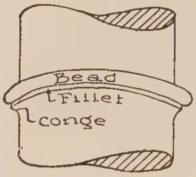


Fig. 8.

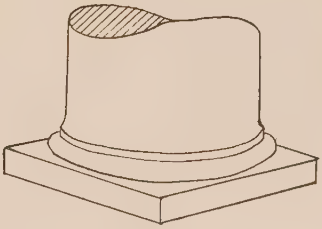
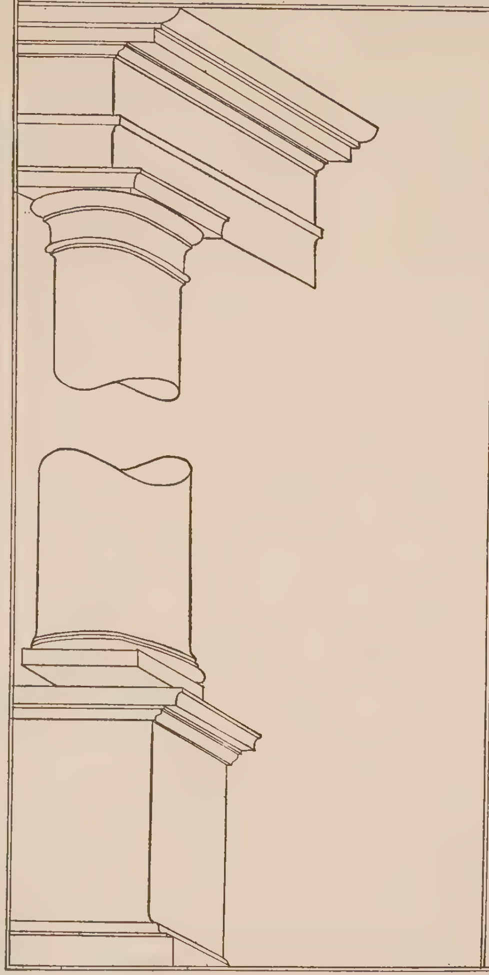


Fig. 9

Plate 17
Comparison of the Orders

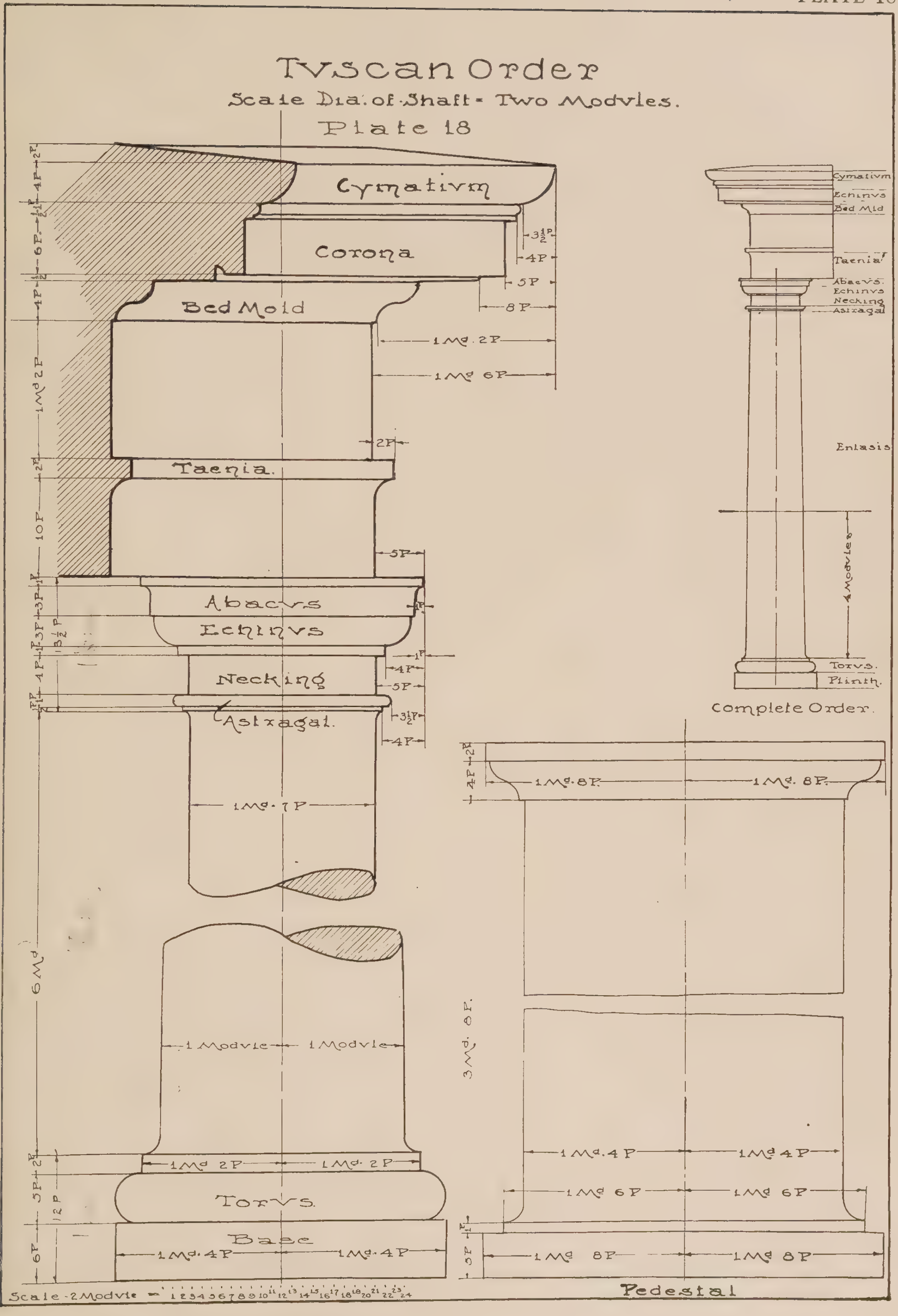
Perspective View of the Order



Names of Featvres				Greek Doric		Tvscan		Doric		Ionic		Corinthian Composite	
Entablatvre	1/4 to 1/5	Cornice	Cymativm Corona Bed Mold	2	1/2	1 3/4	3/4	2	3/4	2 1/4	7/8	2 1/2	1
		Frieze			3/4		1/2		3/4		6/8		3/4
		Architrave	Taenia		3/4		1/2		1/2		5/8		3/4
Colvmn	1	Capital	Abacvs Echinvs Necking	4-6	1/2	7	1/2	8	1/2	9	1/3 1/2	10	7/6
		Shaft	Astragal Cinctvre				6		7		8		8⅓
		Base	Base Mold Plinth		None		1/2		1/2		1/2		1/2
Pedestal	1/3	Cap	Corona Bed Mold	No pedestal bvt three steps. Stylobate.		The cap is 1/9 the height of the pedestal in these orders							
		Die				Pedestal 1/3							
		Base	Base Mold Plinth			The base is 2/9 the height of the pedestal in these orders							

THE TUSCAN ORDER

This is the simplest of the classic orders as it has only a few plain moldings in the construction of the column, pedestal, and entablature. The ovolo molding is used for the cymatium of the cornice, the conge for the corona, the tænia in the astragal of the architrave and column, and the cyma-reversa in the bed molding of the cornice (see Plate 18).


Tuscan Order
Scale Dia. of Shaft = Two Modules.
Plate 18
Cymatium
Corona
Bed Mold
Taenia.
Abacus
Echinus
Necking
Astragal.
Torus.
Base
3½P
4P
5P
8P
1Md. 2P
1Md 6P
2P
5P
1P
4P
5P
3½P
4P
1Md. 7P
1 Module
1 Module
1Md 2P
1Md. 2P
1Md. 4P
1Md. 4P
2P
4P
½P
6P
1½P
1Md 2P
10P
3P
13½P
6Md
2P
5P
12P
6P
Scale - 2 Module = 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Cymatium
Echinus
Bed Mld
Taenia
Abacus.
Echinus
Necking
Astragal
Entasis
4 Modules
Torus.
Plinth.
Complete Order.
2P
4P
1Md. 8P.
1Md. 8P.
3Md. 8P.
1Md. 4P
1Md 4P
1Md 6P
1Md 6P
1P
3P
1Md 8P
1Md 8P
Pedestal

THE DORIC ORDER

The distinguishing features of the Doric Order (see Plates 19, 20, 21, 22) are the triglyphs and mutules in the frieze of the cornice, and the use of the bed moldings. The triglyphs are supposed to represent the ends of beams and rafters in the original Greek and Roman wooden buildings. Under each triglyph is found a small fillet which is called the regula, and underneath this and beneath each triglyph are found objects which are conical or pyramidal in shape. These are called guttæ, and are supposed to represent the heads of wooden pins used in the original wooden building. Under the soffit of every mutule there are eighteen to thirty-six guttæ, which likewise represent the heads of wooden pins.

Two different styles are found in this order: the Mutulary Doric and the Denticulated Doric, the difference between them being chiefly in the design of the cornice. In both styles of the Doric Order, the height of the entablature is the same, that is, twice the base diameter of the column and corona. This height is divided as follows: three-fourths of the base diameter for the cornice, three-fourths for the frieze, and one-half for the architrave. The cornice of both styles is subdivided into four parts. The first, or highest, part of the cornice is the cymatium; the second, the corona; the third, the mutules; and the fourth, the bed molding.

The upper two divisions, the cymatium and corona, are identical in design in both styles, but the third division is entirely different.

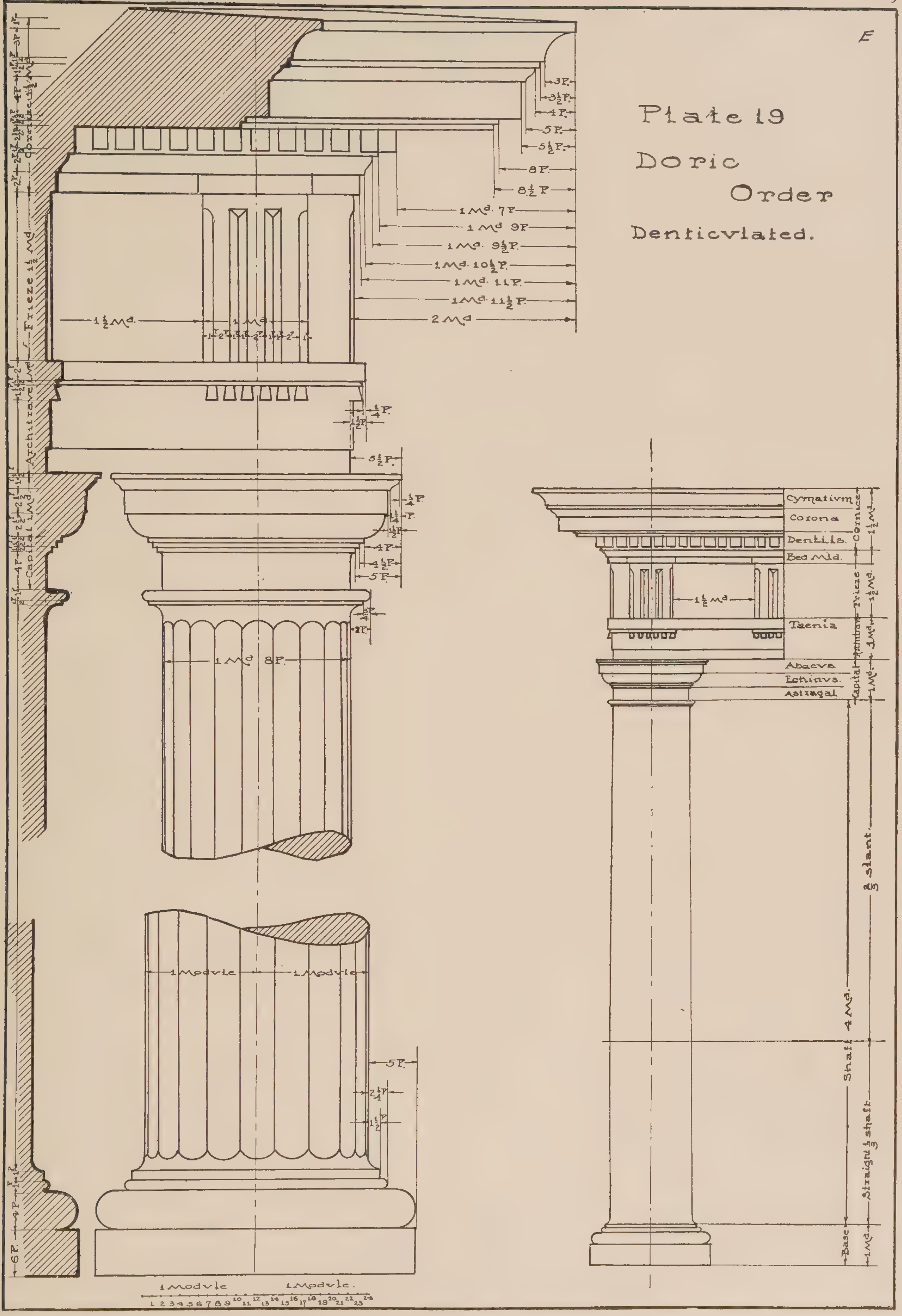
In the Mutulary Doric the third division consists of a broad, low bracket which is called the mutule and is crowned with a fillet and a cyma-reversa molding. On the soffit of each mutule are placed thirty-six guttæ and a drip cap molding. The frieze of the cornice has triglyphs, which are one-half of the base diameter in width and are spaced one-fourth of the base diameter apart.

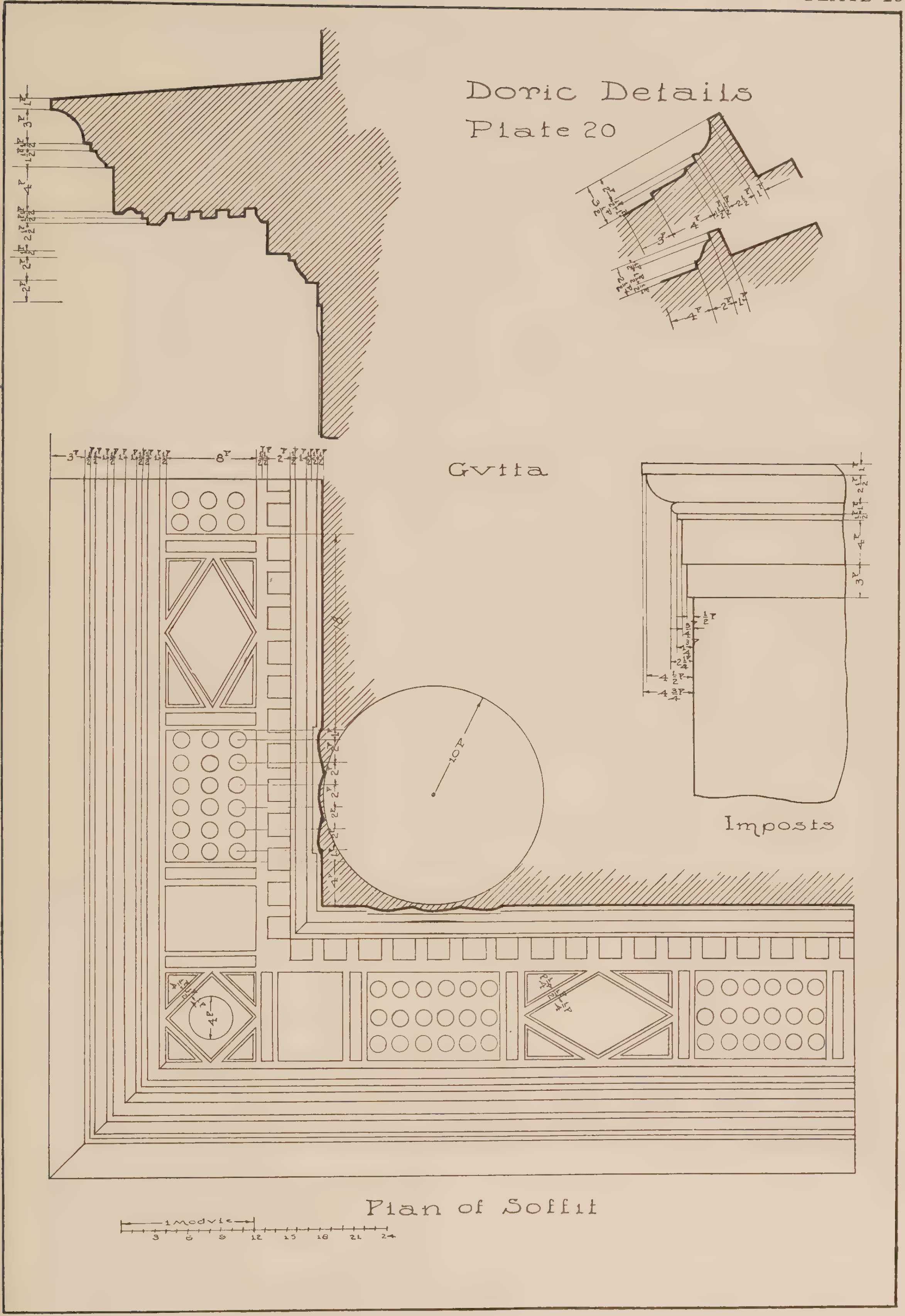
In the Denticulated Doric, in the third division (the architrave), there is a small row of blocks called dentils, which take the place of the brackets. These blocks are one-eighth of the base diameter in height, and are spaced one-eighth of the base diameter from the center line of one dentil to that of the next.

In both styles of this order, the triglyphs and their capitals are identical in design and are placed directly above the column. The space between two triglyphs is called the metope, and should be square in shape, the side of the square being three-fourths of the base diameter. Each triglyph is divided into three equal parts, which are called shanks and are beveled at an angle of 45°. This feature is very noticeable as the Doric Order is the only one that shows beveled edges.

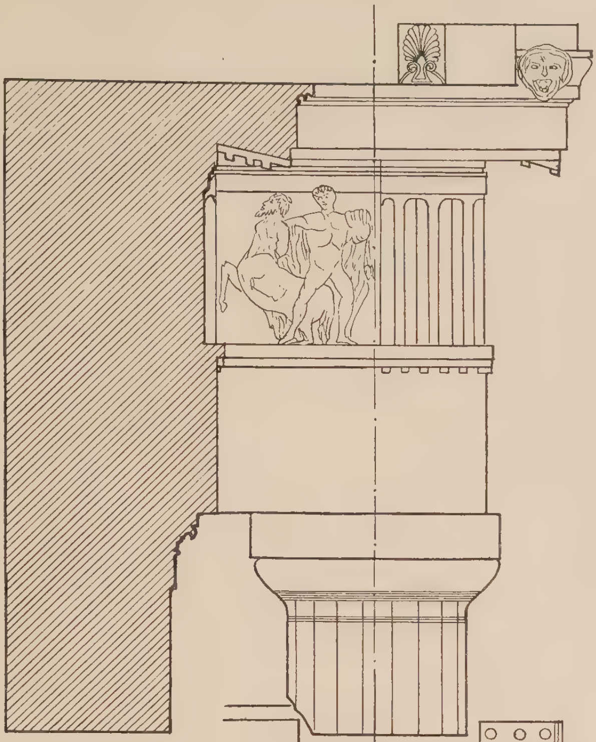
The column of the Doric Order is eight base diameters in height, and its base and capital are each one-half the base diameter in height. The projection of the cornice beyond the face of the column is equal to one base diameter.

The column of the Doric Order has twenty semi-circular sections called flutes, each of which is approximately one-sixth of the base diameter in width. Each flute is separated from the next by a solid edge called the arris.


E
Plate 19
Doric
Order
Denticvlated.
3P.
3½P.
4P.
5P.
5½P.
8P.
8½P.
1 Md. 7P.
1 Md. 9P.
1 Md. 9½P.
1 Md. 10½P.
1 Md. 11P.
1 Md. 11½P.
2 Md.
1½ Md.
1 Md.
Frieze 1½ Md.
Architrave
Capital 1 Md.
Cornice 1½ Md.
¼P.
1½P.
5½P.
4P.
4½P.
5P.
1 Md. 8P.
1 Modvle
1 Modvle
5P.
2¼P.
1½P.
6P.
Cymativm
Corona
Dentils.
Bed Mld.
Taenia
Abacvs
Echinvs.
Astragal
Cornice 1½ Md.
Frieze 1½ Md.
Architrave 1 Md.
Capital 1 Md.
1½ Md.
⅔ slant.
4 Md.
Shaft
Straight ⅓ shaft
Base
1 Md.
1 Modvle
1 Modvle.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

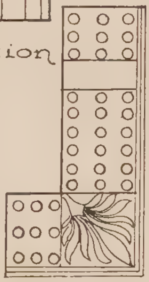

Doric Details
Plate 20
Gvtta
Imposts
Plan of Soffit
10P
4P
8P
1 Module
3
6
9
12
15
18
21
24

Doric Order
from the
Parthenon -
Plate 21.

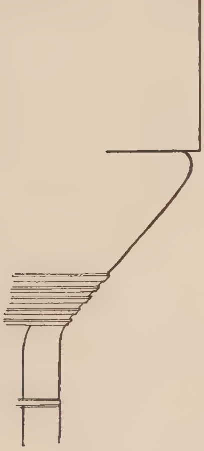


Elevation

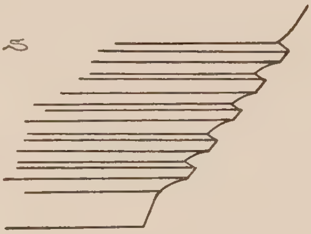
Note:-
For dimensions of all details of the Doric Order, see the special Doric Detail drawing



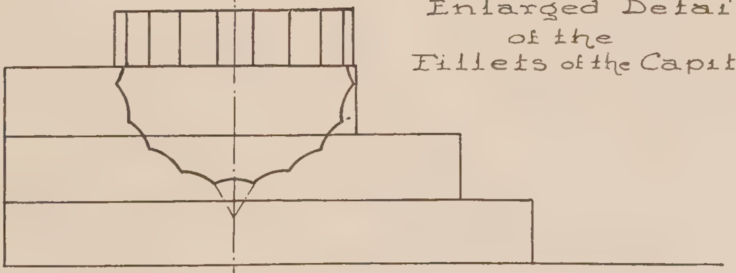
Enlarged Detail
of the
Mvtvles



Enlarged Detail
of the
Capital

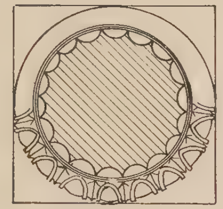


Enlarged Detail
of the
Fillets of the Capital.

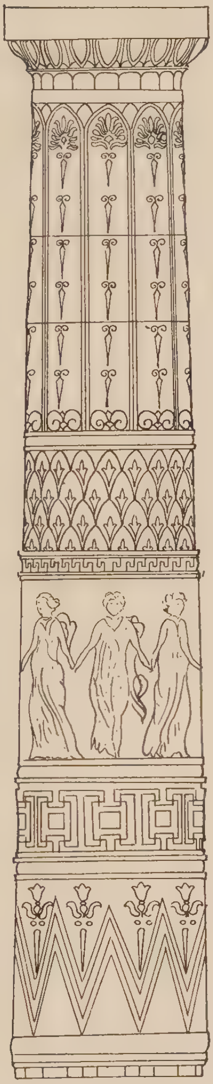


Base

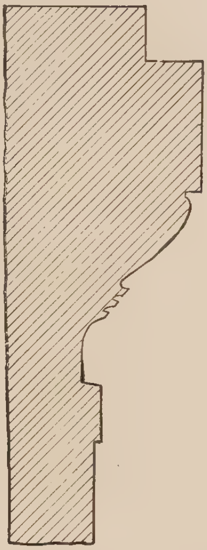
Doric Order.
Plate 22



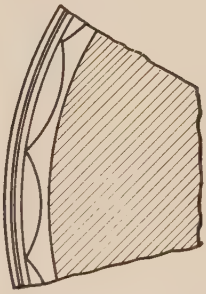
Plan through Fluting of Neck, Looking up



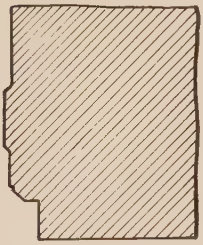
Elevation of Column



Enlarged detail of Capital.



Plan at ground, looking up



Section through Base

THE IONIC ORDER

The Ionic Order originated in the temples of Persia, Assyria, and Asia Minor, and, like the Doric, it seems to have developed from primitive wooden construction. The dentils in the Ionic Order are copied from those of the Doric, and are supposed to represent pieces of wood laid together to form the beams of the roof. The distinguishing features of the Ionic Order are the scrolls, or volutes, which are found in the capitals of the columns. These also seem to have come from the temples of Assyria and Egypt. The frieze of the Ionic column is generally designed with very few moldings and is simple in construction, but when carvings are used the surfaces of the frieze are curved.

The capital of the Ionic column is also similar in design to that of the Doric column, but it is without the necking (see Plates 23, 24, and 25) and is only two-sixths of the base diameter in height. The capital is divided into two parts, the abacus, which is the upper part, being half the height of the lower part, which consists of the scrolls. The abacus is much smaller than that of the Doric Order, and projects beyond the echinus. The eye of the scroll is equal in diameter to one-sixteenth of the base diameter.

The Roman Ionic Order.—(See Plates 23, 24, and 25.) In the Roman Ionic Order the echinus is usually covered with carvings in which the "egg-and-dart" predominates. When the capital is viewed from the front, these carvings are seen between the scrolls, but the ones on the side are hidden by the representation of the sprigs of honeysuckle vine. When the capital is viewed from the sides, the scrolls appear as a series of modillions and balusters.

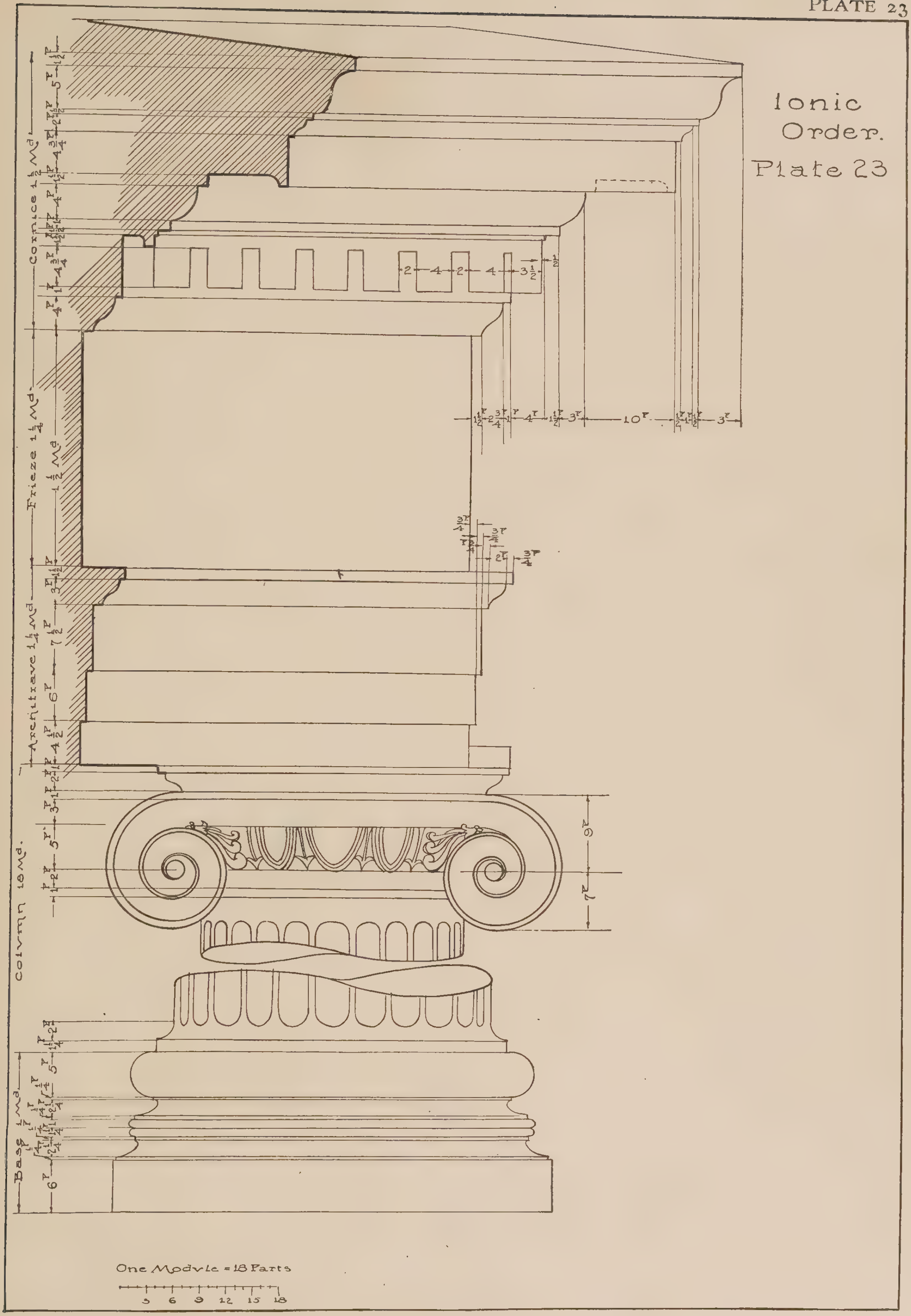
The shaft of the Ionic column is divided into twenty-four equal parts, each part being called a flute. The flutes are semi-circular in section and are separated by fillets which are one-fourth the width of the flutes.

The original Ionic base consisted only of a scotia molding, but sometimes the Attic base was used. This consisted of a scotia molding and two fillet moldings placed between two large tori; these were placed above a square plinth base. Wonderful examples of the Ionic Order are found in the Theatre of Marcellus and the Temple of Fortuna Virilis in Rome.

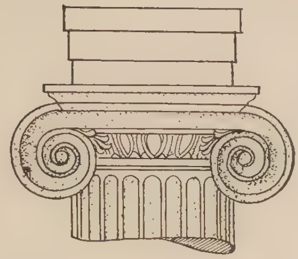
The Greek Ionic Order.—The general proportions of the Greek Ionic column are similar to those of the column of the Doric Order, except that the Ionic column is slenderer, its height being seven to ten base diameters. The base of the Greek Ionic column is similar to the Attic Ionic base, but without the square plinth base. The scotia is much larger than that of the Attic base, and the upper torus is larger than the lower one. The shaft of the Greek Ionic column is fluted with twenty-four channels, and is similar in design to the shaft of the Roman Ionic Order. In the construction of the capital, the scrolls are much larger and more nearly vertical than in the Roman Ionic Order. The abacus of the capital is very small in the Greek Ionic, and the sprigs of honeysuckle vine do not cover the egg-and-dart but leave it visible to the eye.

The architrave of the entablature is sometimes decorated and sometimes left plain, but in either case it is divided into spaces by two or three bands.

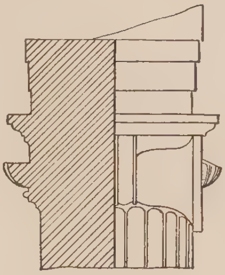
The frieze of the entablature is quite wide, without any decorative features; but the bed molding, which is above it in the cornice, is sunk into the soffit of the corona. In the Greek Ionic, the dentils are often omitted, although they are the distinguishing feature of the Roman Ionic column. In the upper section, or cymatium, of the Greek Ionic cornice, the style of the moldings differs from that of the Roman cornice, the cymatium consisting, in most cases, of a large cyma-recta with a fillet molding below. This is sometimes undercut, thus becoming a beak molding. In some cases the Greek Ionic capital has its four surfaces similar in design. There are then eight scrolls, two to each surface, making a double scroll on each corner. The scrolls are connected under the abacus, the top member of the capital, by a continuous curve.


Ionic
Order.
Plate 23
Cornice 1½ Md
Frieze 1¼ Md
1½ Md
Architrave 1¼ Md
Column 18 Md.
Base ½ Md
2 4 2 4 3½
10P
9
7
One Module = 18 Parts
3 6 9 12 15 18

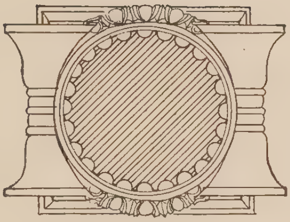
Ionic Order, Details
Plate 24



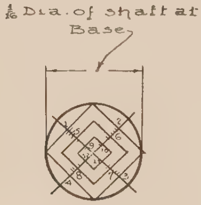
Capital, Elevation



Side View
Sectional Side.

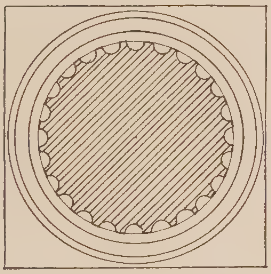


Plan at Neck

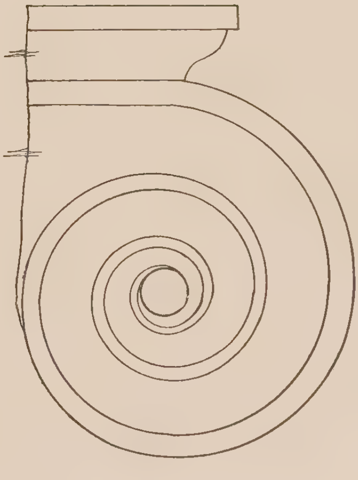


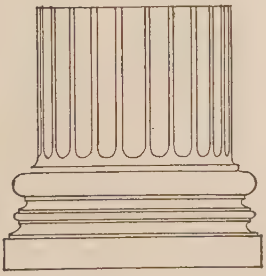
Compass
Centers for Volute

Note:-
The numbers 1,2,3,4,5, 6, etc. are centers for the outer volute. The black dots are for the inner volute



Plan at Base

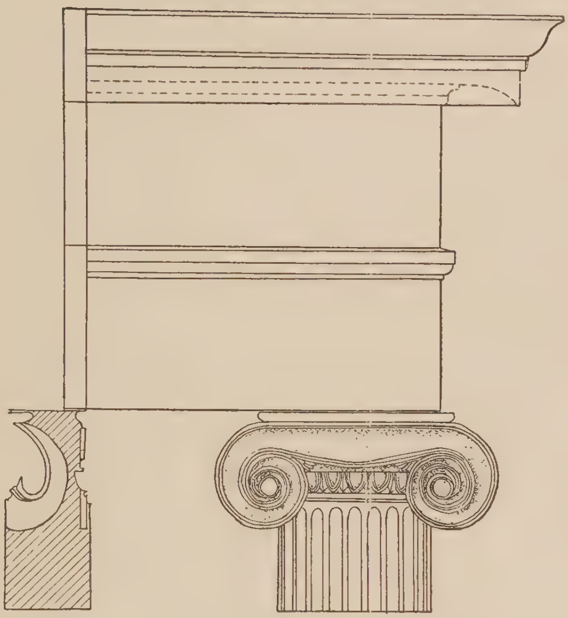




Elevation, Base

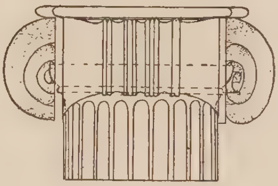
Volute

Ionic Order:
Details taken from the
Temple on the Illissus
Plate 25

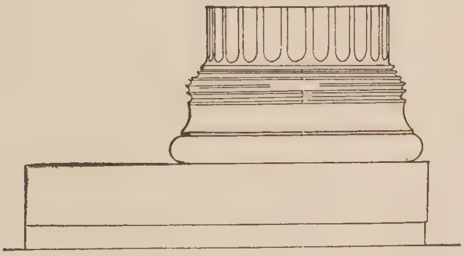


Section through capital

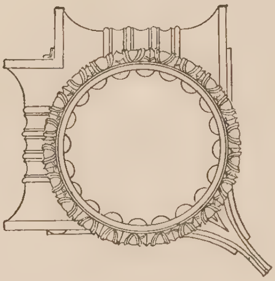
Elevation of capital



Elevation of Corner Capital



Elevation of Base



Plan of Corner Capital

THE CORINTHIAN ORDER

This order has three distinguishing features. (See Plates 26, 27, 28, 29, 30, 31, and 32.)

1. The series of brackets, called modillions, which appear to support the cornice.
2. The general effect of richness and the use of the acanthus motif in both the capital and the modillion.
3. The tall, bell-shaped, curved capital.

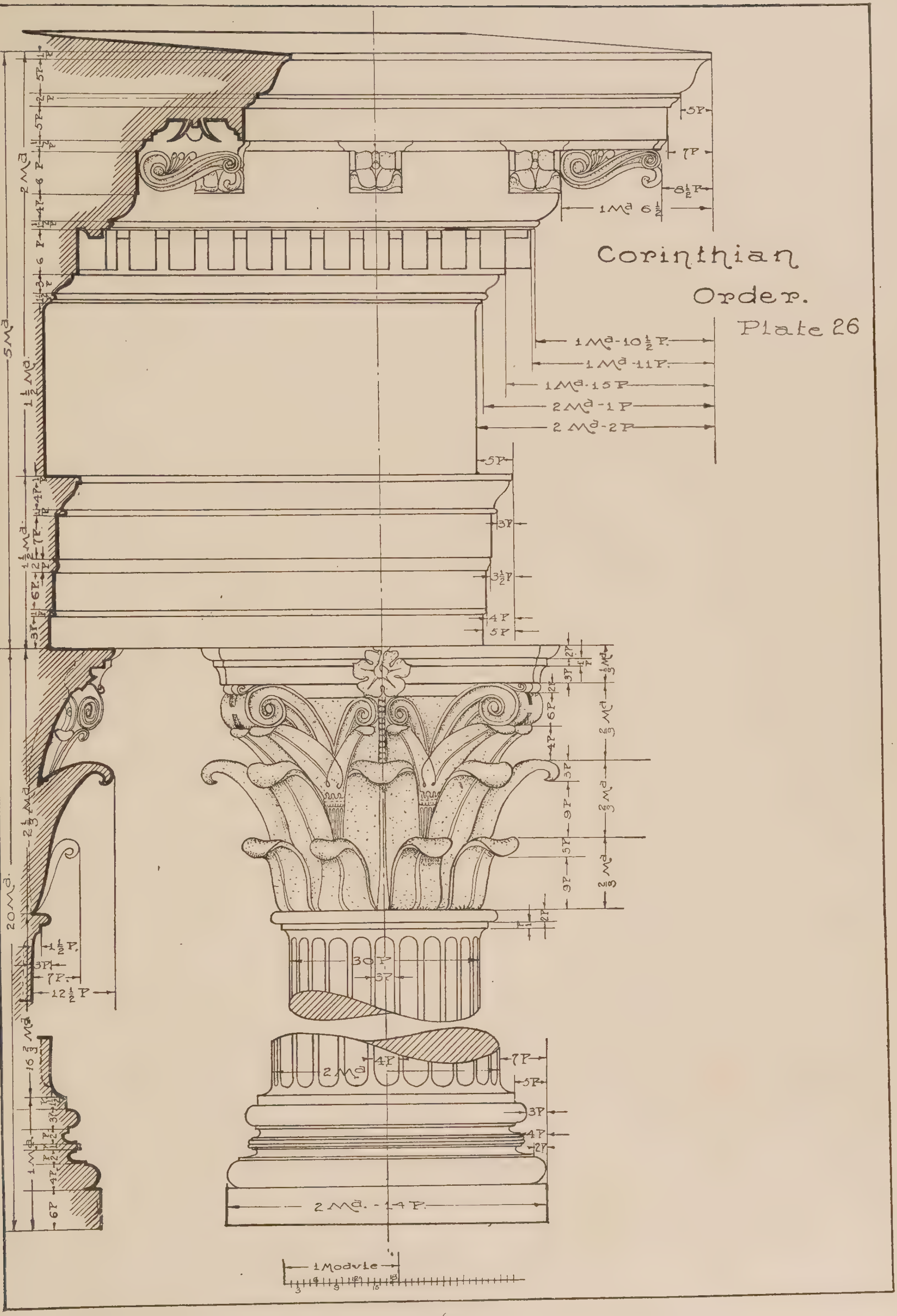
In the design of the upper part of the column, the cornice is divided into five parts. The highest of these divisions is similar in design to the corresponding part of the Doric column, as are also the lowest division and the one directly above it. The center division is entirely different in design, being composed of a modillion band on which is a double scroll, together with the representation of the acanthus leaves. The space on the soffit of the corona between the modillions is filled with a built-in molding which is called the caisson. In the center of this is a rosette. The caisson is generally twice the width of the modillion.

The frieze of the Corinthian entablature may be either plain or sculptured. The capital is always very finely carved, its bell being composed of three rows of acanthus leaves. The middle row consists of eight leaves which bend down from the top, the greatest width of these leaves being seven-sixths of the base diameter. They are so arranged that four leaves face the sides of the capital, and four face the corners. Below this row of acanthus leaves is another one, placed so that the leaves alternate with those of the row above. From behind these leaves, and between those of the row above, there arise eight vertical stalks which are called cabbage stalks, or cauliculi. On the end of each cauliculus is a small round object shaped like a button; and upon this rests a kind of bud, which terminates in two acanthus leaves, one sloping to the corner of the capital and the other sloping directly to the front center under the fleuron. As there are eight cauliculi and each gives rise to two acanthus leaves, this third, or top, row consists of sixteen acanthus leaves. From each cauliculus there also arise two scrolls, one of which supports a corner of the abacus and the other the fleuron. The sixteen acanthus leaves of the top row curl out under the scrolls and give the shape of an eight-pointed star in the plan view of the capital.

The Attic base is generally used in the Corinthian Order, but in many instances this base has been redesigned, with additional moldings.

The shaft is fluted into twenty-four equal parts, each part being semi-circular in shape. The flutes are separated by fillets, which are one-fourth the width of the flute.

Fine examples of the Corinthian Order can be found among the buildings in Rome.


Corinthian
Order.
Plate 26
5P
7P
8½P
1Md 6½
1Md-10½P.
1Md-11P.
1Md-15P
2Md-1P
2Md-2P
5P
3P
3½P
4P
5P
5Md
2Md
1½Md
1½Md
20Md.
2⅓Md
16⅔Md
1Md
⅓Md
⅔Md
⅔Md
⅔Md
1½P.
3P
7P.
12½P
30P
3P
2Md
4P
7P
5P
3P
4P
2P
2Md.-14P.
6P
1 Module

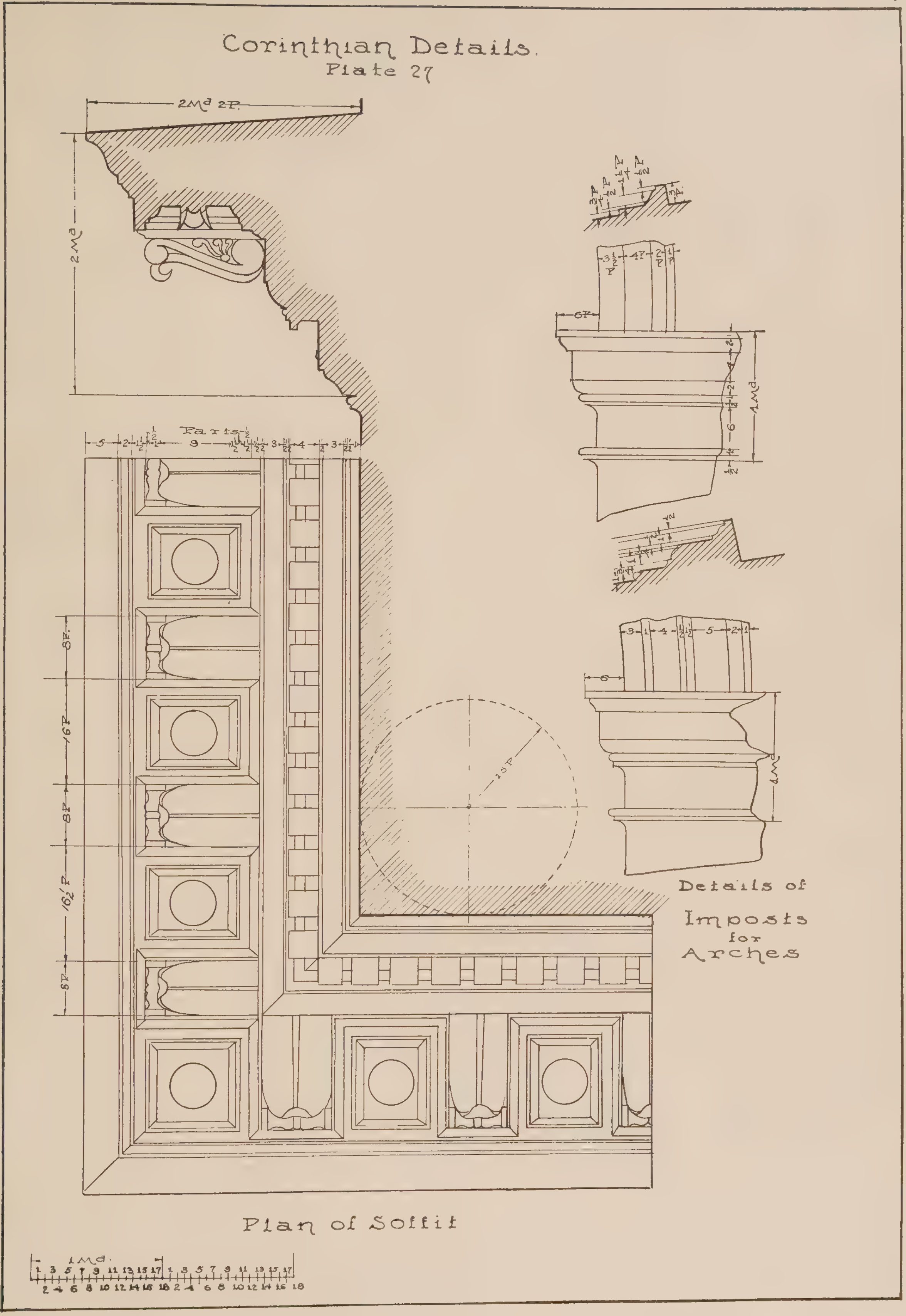
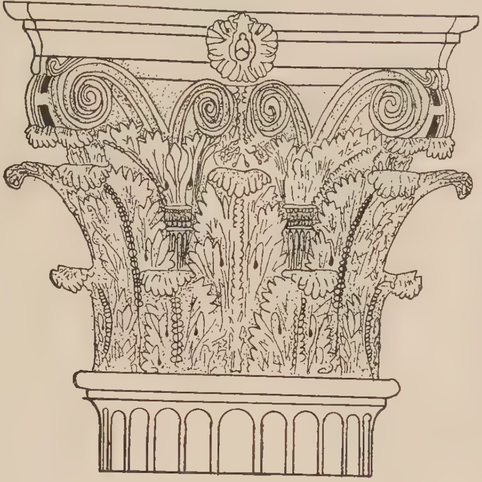
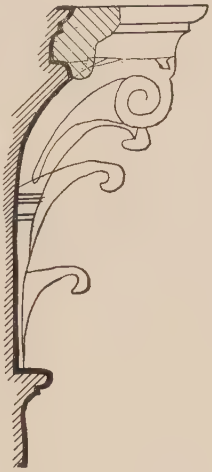

Corinthian Details.
Plate 27
2Md 2P.
2Md
Parts
8P.
16P
8P
16½P
8P
15P
6P
1Md
6
1Md
Details of Imposts for Arches
Plan of Soffit
1Md.

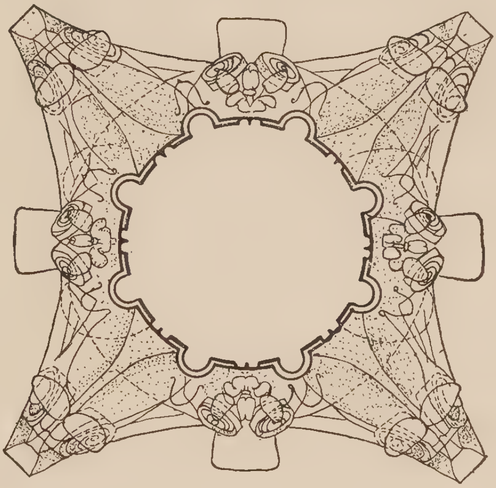
Plate 28. Corinthian Details



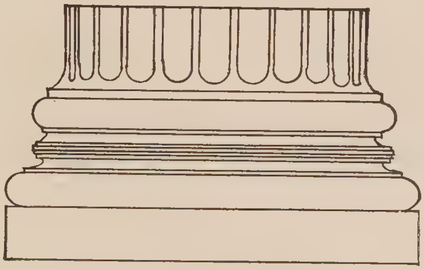
Corinthian Capital



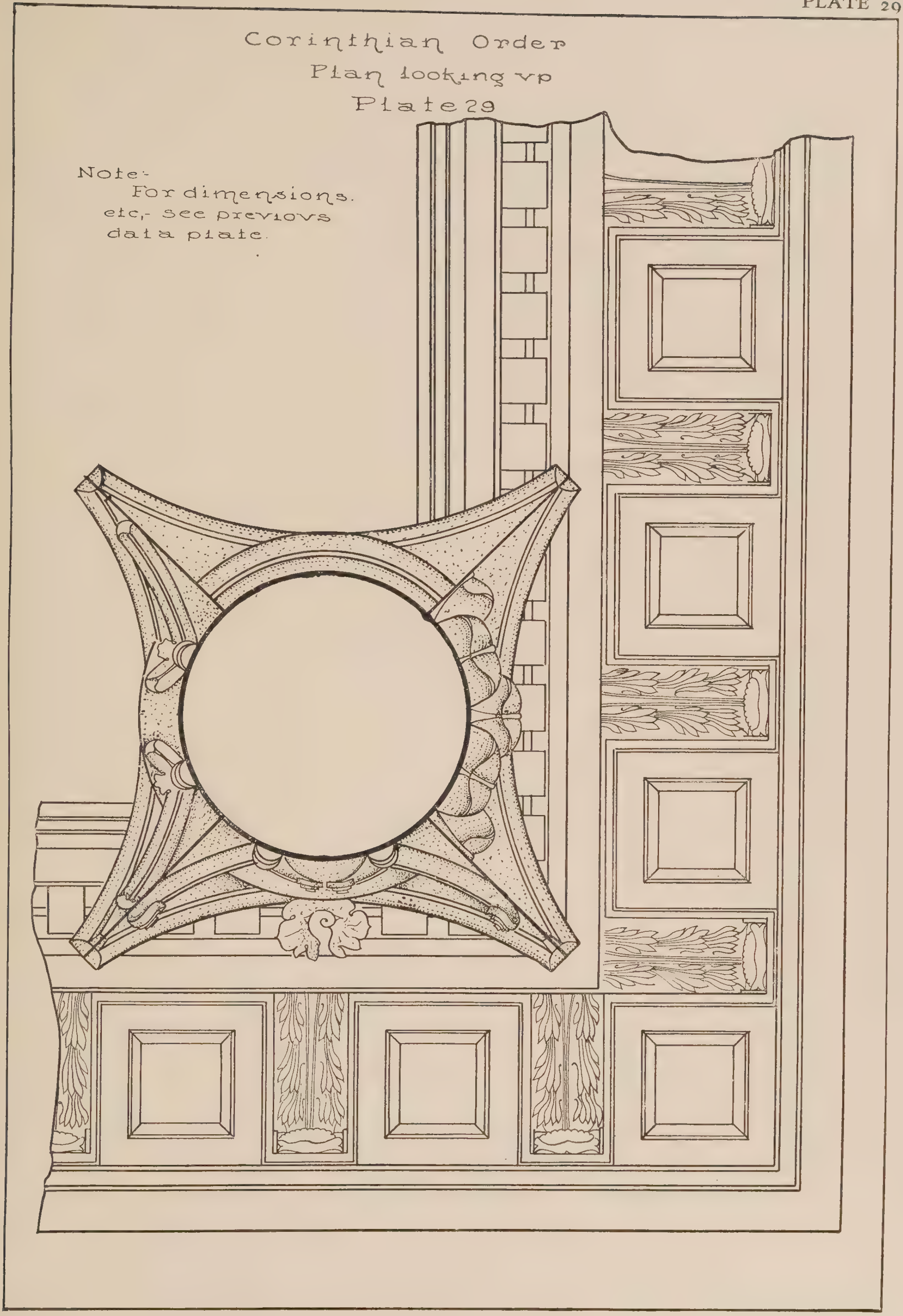
Section



Plan, looking up



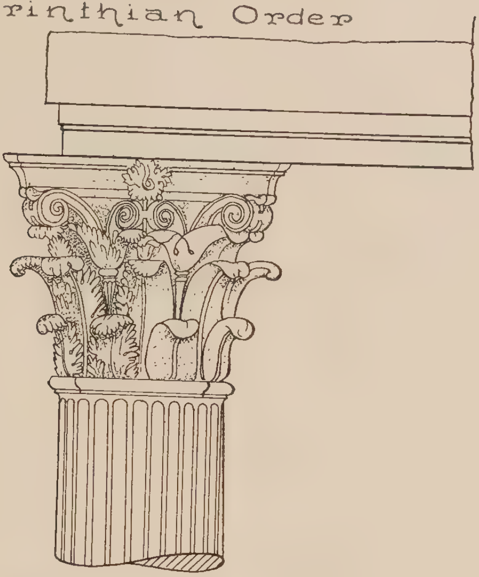
Base



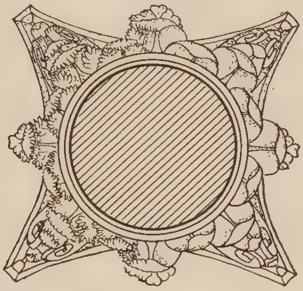
Corinthian Order
Plan looking up
Plate 29

Note:-
For dimensions.
etc,- see previous
data plate.

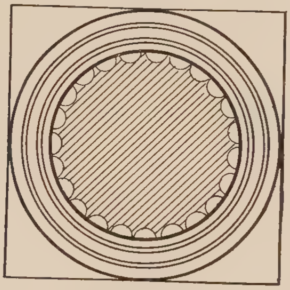
Plate 30 Corinthian Order



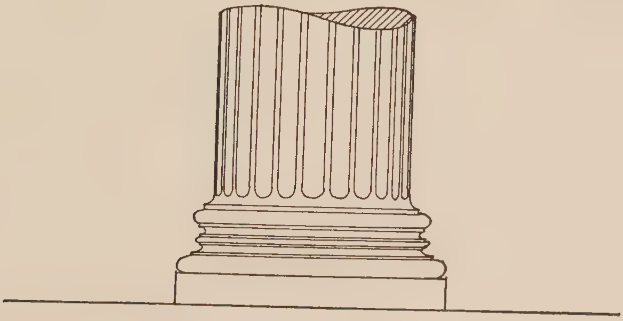
Elevation of Capital



Plan through Shaft, looking up

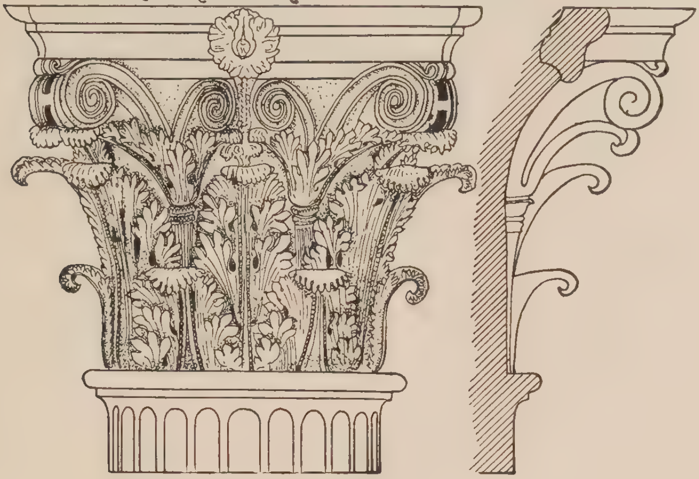


Plan through Shaft, looking down

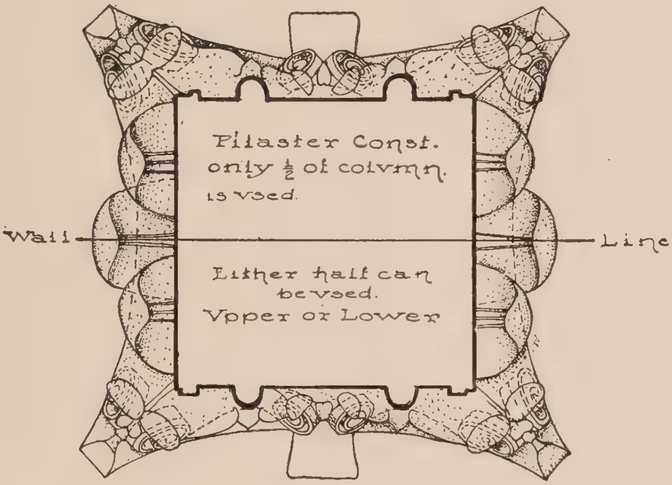


Elevation of Base

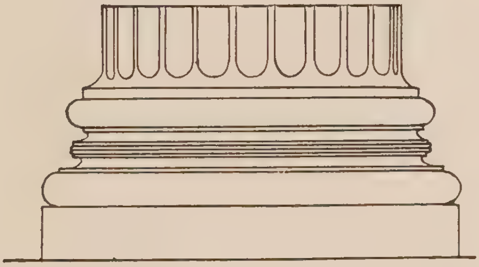
Corinthian Pilaster Plate 31



Corinthian Pilaster

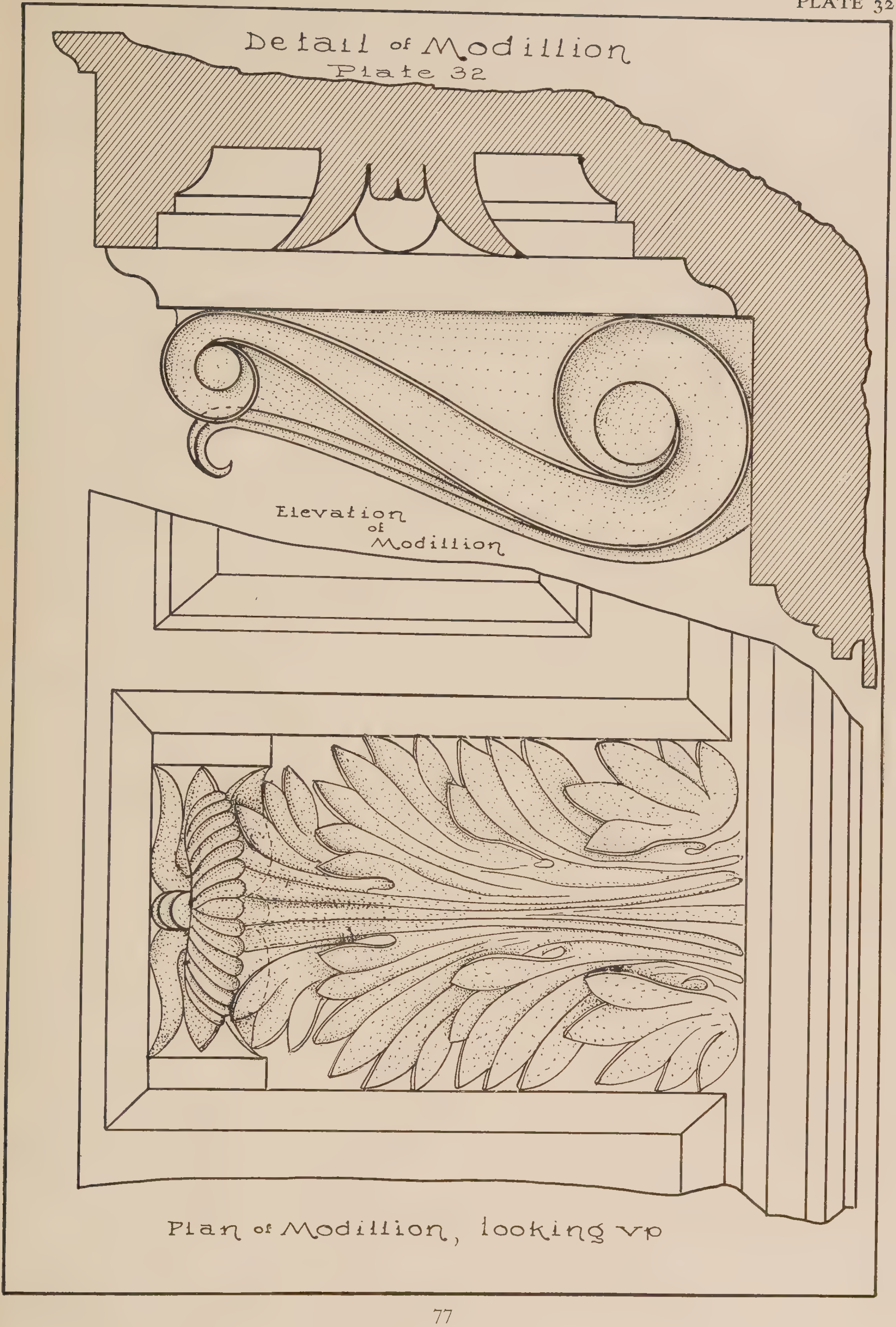


Corinthian Pilaster.
looking up



Corinthian Base

Note:
for dimensions see special detail drawing.

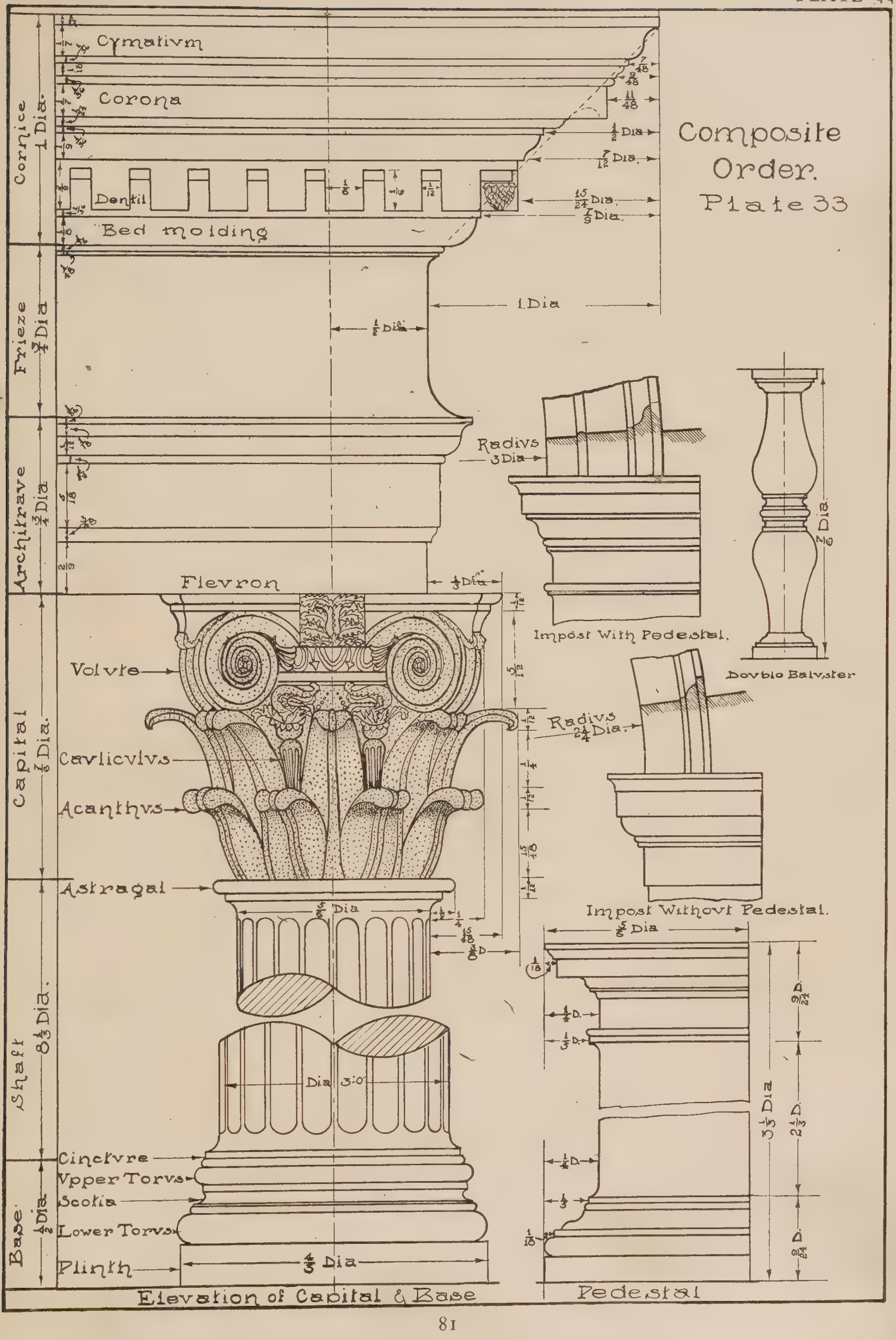

Detail of Modillion
Plate 32
Elevation of Modillion
Plan of Modillion, looking up

THE COMPOSITE ORDER

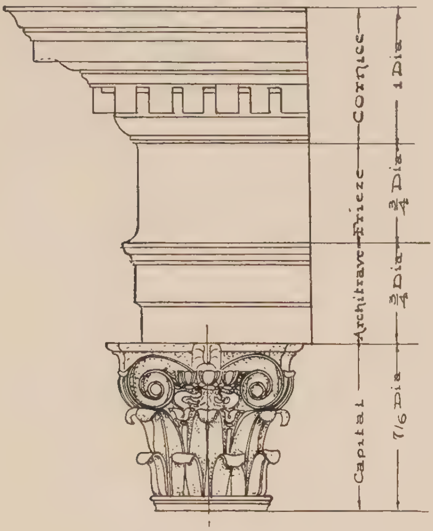
The Composite Order (see Plates 33, 34, and 35) derives its name from the fact that it is composed of elements of different orders. The principal parts are copied from the Corinthian Order, the details being fewer in number but larger. The lower half of the capital is practically the same as that of the Corinthian Order. It has the two lower rows of acanthus leaves and cabbage stalks, or cauliculi; but above these leaves the construction of the capital is similar to that of the Ionic Order. However, the cabbage stalk, or cauliculus, carries only a stunted bud. The scrolls, or volutes, are larger than those of the Corinthian Order, the four sides of the capital being similar in design. The scrolls are one-half the base diameter in height, and cover half of the abacus. They bend over so as to touch the upper row of acanthus leaves.

The dentils are much larger than in the Ionic Order, and are square in shape.

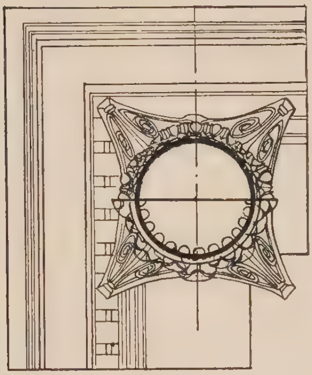
Fine examples of the Composite Order are to be found in the Arch of Titus in Rome, and among the temples in Athens.


Composite Order. Plate 33
Cornice 1 Dia.
Cymativm
Corona
Dentil
Bed molding
Frieze 3/4 Dia
Architrave 3/4 Dia
Capital 1 1/6 Dia.
Shaft 8 1/3 Dia.
Base 1/2 Dia
7/48
9/48
11/48
1/2 Dia
7/12 Dia.
15/24 Dia.
5/9 Dia.
1/6 Dia
1 Dia
1/3 Dia
Flevron
Volvte
Cavlicvlvs
Acanthvs
Astragal
5/6 Dia
Dia 3'-0"
Cinctvre
Vpper Torvs
Scotia
Lower Torvs
Plinth
4/3 Dia
Radivs 3 Dia
Impost With Pedestal.
7/6 Dia.
Dovble Balvster
Radivs 2 1/4 Dia.
Impost Withovt Pedestal.
5/6 Dia
3 1/3 Dia
9/24 D.
2 1/3 D.
2/24 D.
Elevation of Capital & Base
Pedestal

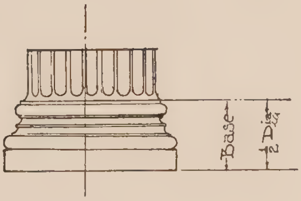
Composite Order
Plate 34



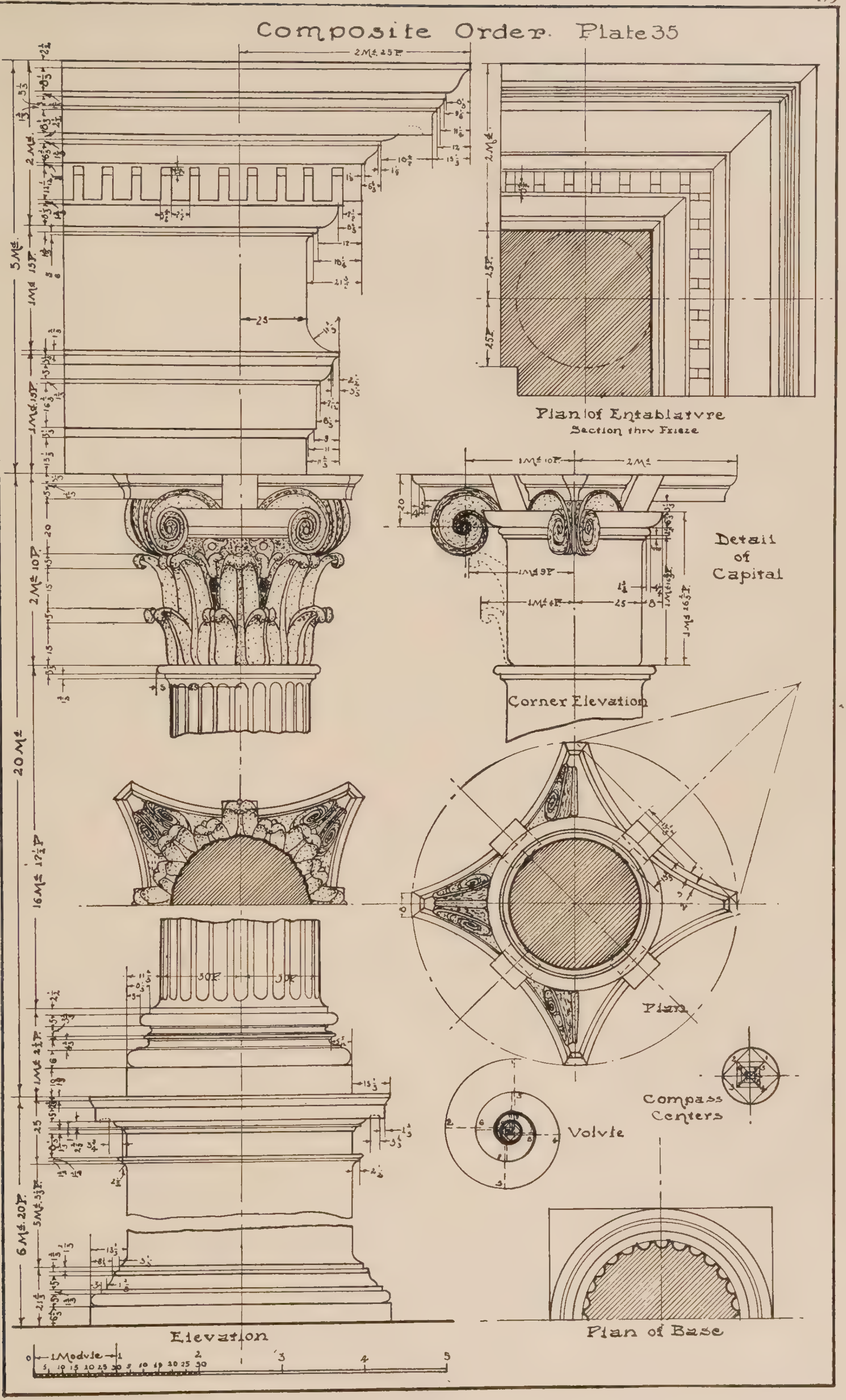
Elevation of Entablature.



Plan of Entablature,
looking up



Base


Composite Order. Plate 35
2 Mᵈ 25 P.
5 Mᵈ
2 Mᵈ
1 Mᵈ 15 P.
1 Mᵈ 15 P.
2 Mᵈ 10 P.
20 Mᵈ
16 Mᵈ 17½ P.
6 Mᵈ 20 P.
5 Mᵈ 3 P.
1 Mᵈ 2½ P.
25
30 P.
Plan of Entablature
Section thru Frieze
2 Mᵈ
25 P.
1 Mᵈ 10 P.
Detail of Capital
1 Mᵈ 9 P.
1 Mᵈ 6 P.
Corner Elevation
Plan
Volute
Compass Centers
Elevation
Plan of Base
1 Module
0 1 2 3 4 5
5 10 15 20 25 30 5 10 15 20 25 30

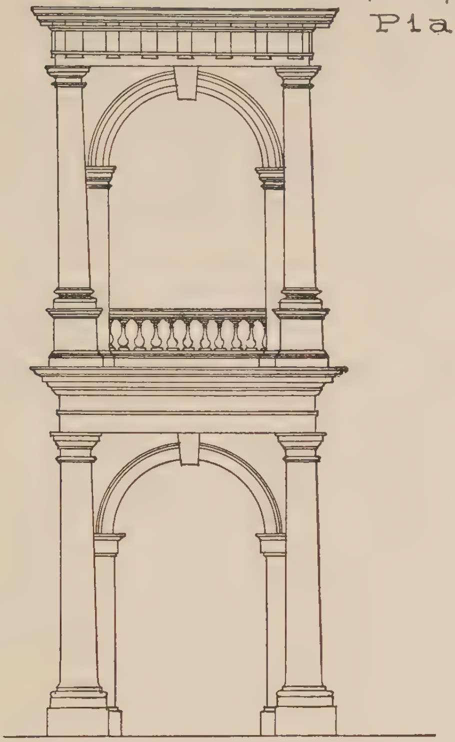
SUPERPOSITION

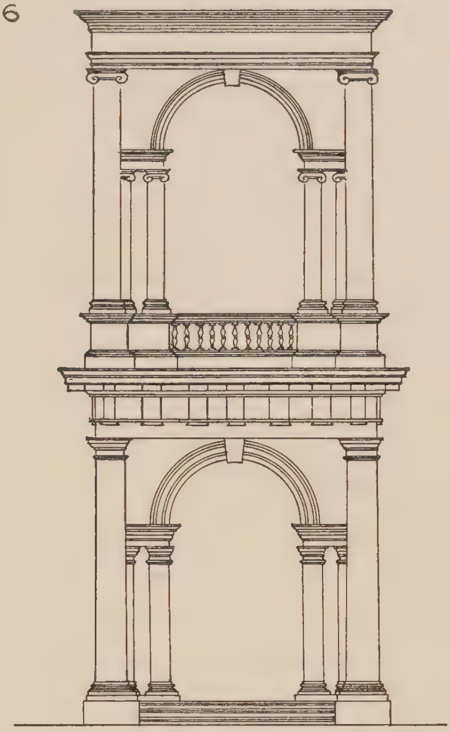
The term superposition, when used in connection with the Classic Orders of Architecture, denotes the setting of columns one over another, according to a regular system (see Plate 36). This arrangement is found in the Roman amphitheaters and is used in many modern buildings. The more solid column of the Tuscan or Doric Orders is generally placed below, and the Ionic, Corinthian, or Composite column above.

The upper column should be smaller than the one below, and the axes of both should form a straight line, as viewed from the front. From the side, however, one column is seen to be placed a little farther back than the one below it, thereby avoiding a top-heavy appearance.

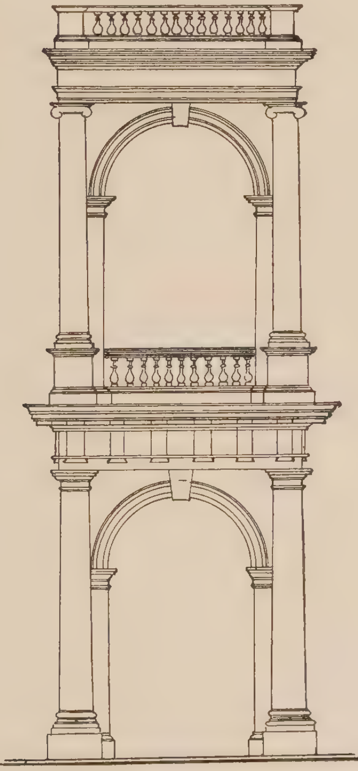
In the Renaissance period, the columns were so constructed that the base of the upper one was equal to the diameter of the neck of the column directly below it. In modern construction, the lower diameter of each column equals the upper diameter of the shaft below it; thus the two appear as a single tapered column.

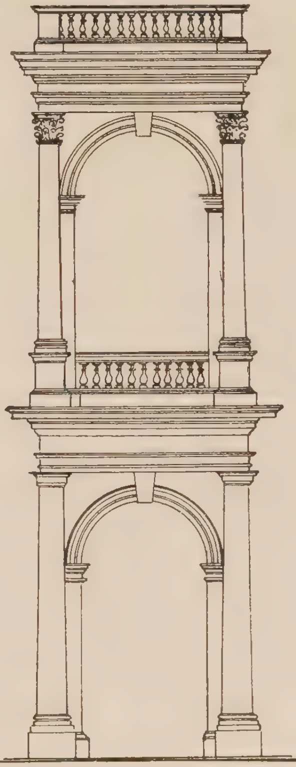
Svperposition
Plate 36





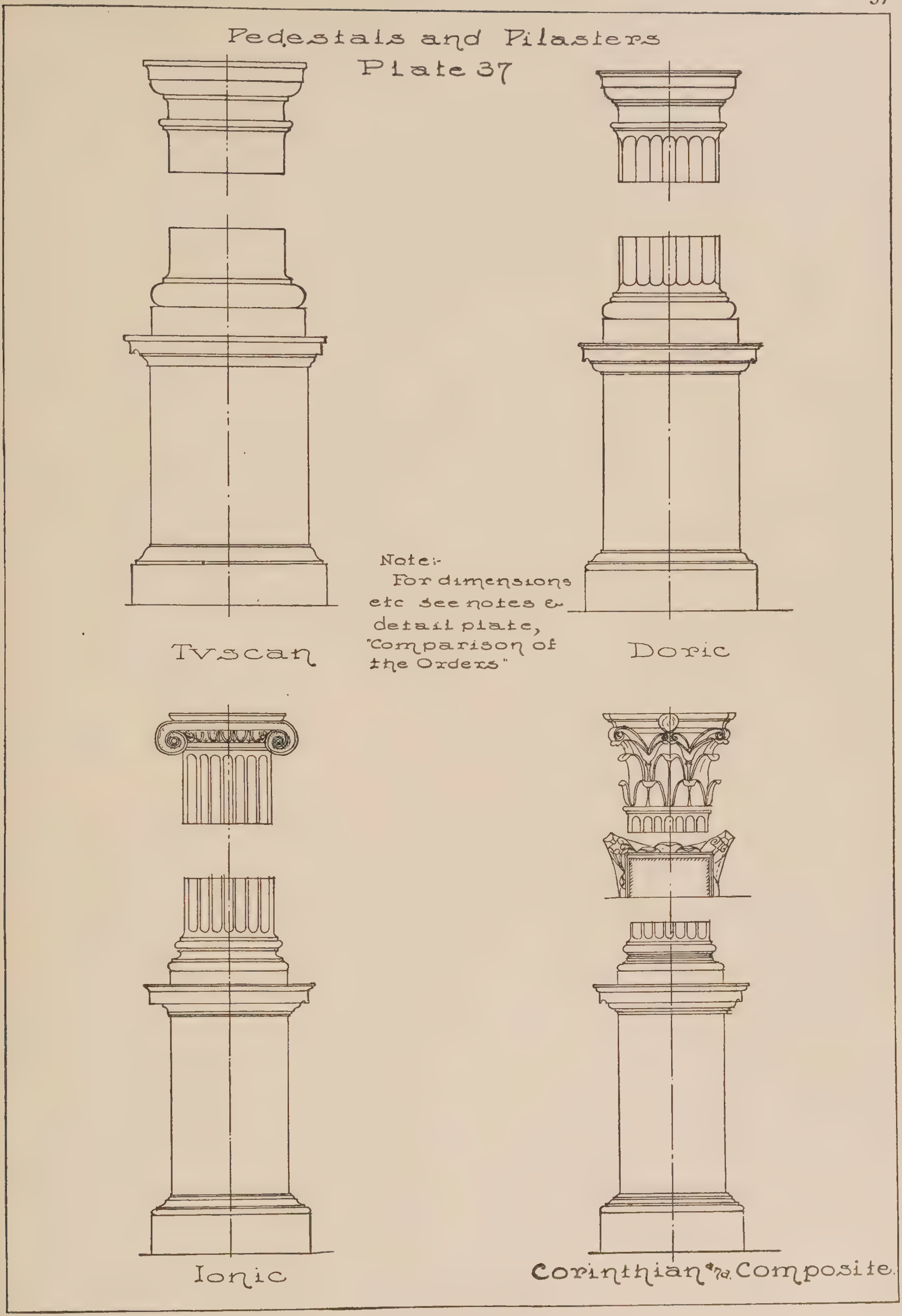
In designing colvmn-svperposition constrvction it is advisable to place the heavy form of the Tvscan & Doric orders below the Ionic & Corinthian colvmns





PEDESTALS

When a column is erected on a supporting structure, this structure is called a pedestal (see Plate 37), and is generally one-third of the height of the column. The capital of the pedestal is usually one-ninth of its height, and generally consists of a bed molding and corona. As guttæ are never used, no cymatium is required. The base is generally two-ninths of the height of the pedestal, and consists of a square plinth and a base molding, which is generally a cyma-recta with a torus molding below.


Pedestals and Pilasters
Plate 37
Note:-
For dimensions etc see notes & detail plate, "Comparison of the Orders"
Tvscan
Doric
Ionic
Corinthian & Composite.

PARAPETS

In buildings in which columns are used, there are generally low walls, sometimes on the roof, sometimes between the floors, and sometimes on the level of the pedestal. These are called parapets (see Plate 38). They are from three to four feet in height, and are made stronger by the placing of pedestals, of the same height or higher, at regular intervals.

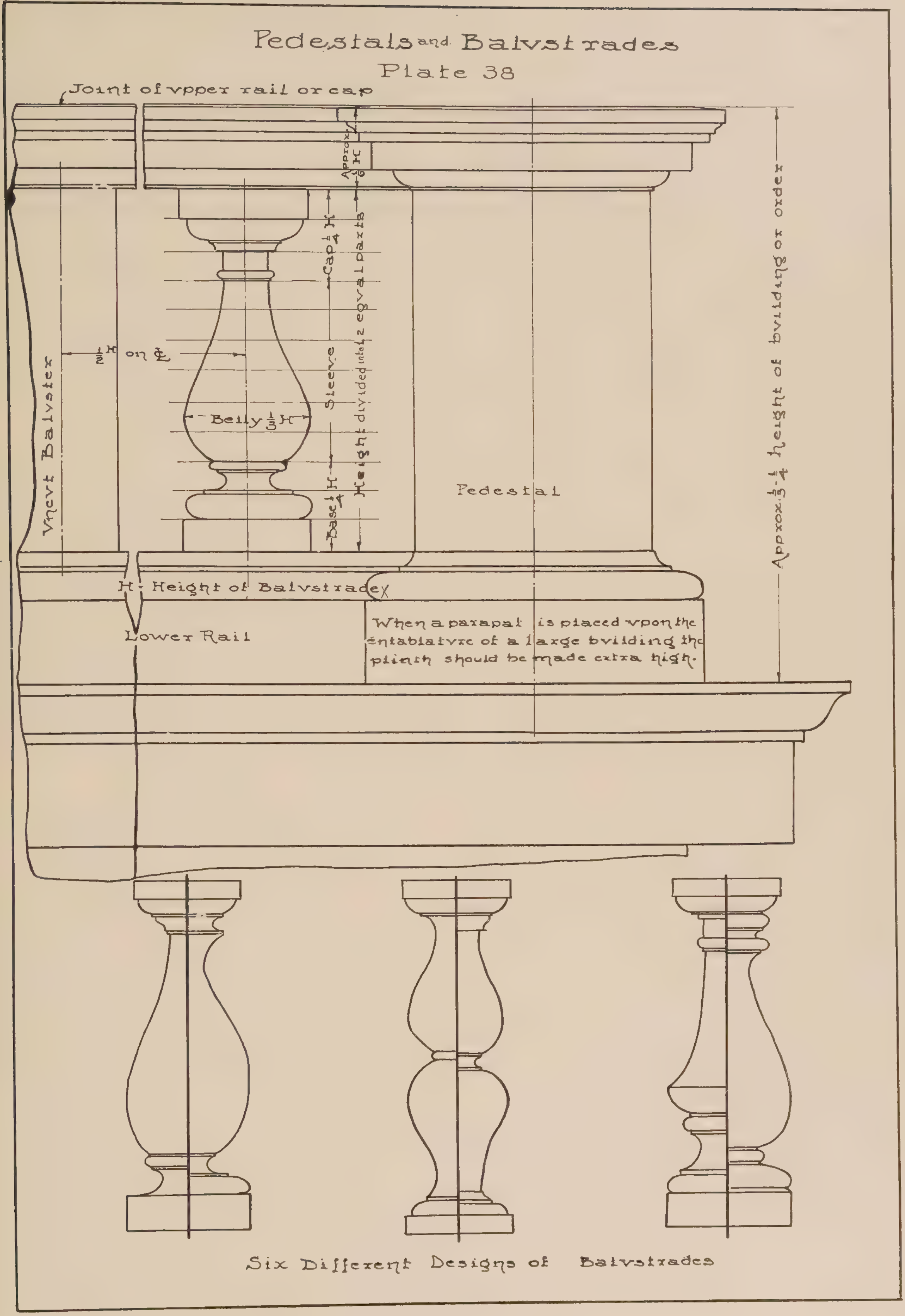
BALUSTERS

In modern buildings, balusters (see Plate 38) are used to fill openings in the parapet walls. They conform to the design of the particular classic order used in the design of the building. The space between two balusters is generally equal to one-half of their height.

Capital and Base.—(See Plate 38.) The capital and base of each baluster are called the upper and lower rails, respectively. They extend from one pedestal to the next. The height of these rails is generally one-sixth to two-sixths of the space between them, but sometimes they are much heavier.

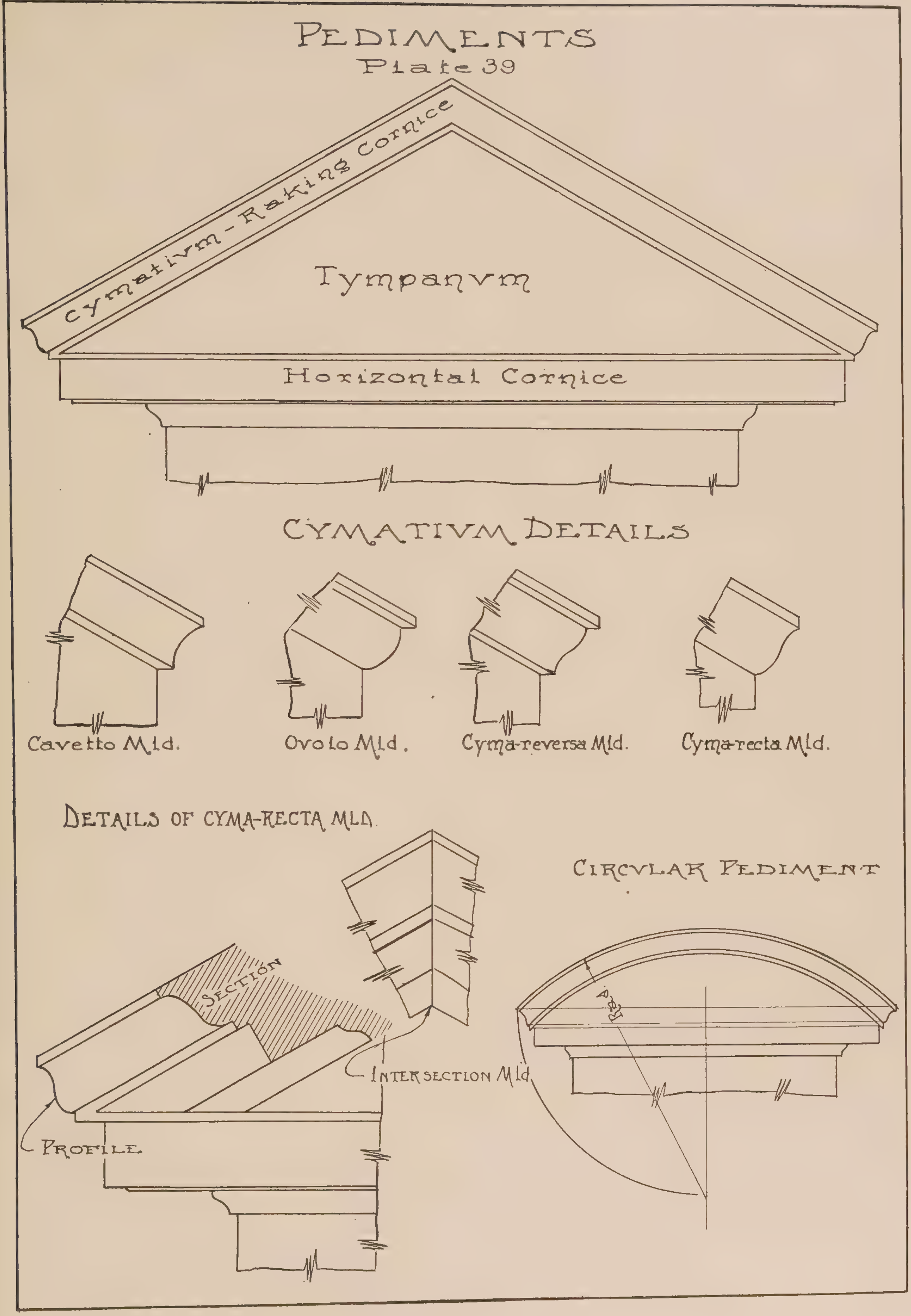
ATTICS

When a parapet wall is placed on top of the entablature of a building (see Plate 38) it is called an attic. Attics vary in height and in architectural design. Sometimes the attic is made one-fourth the height of the order below, but it should never be more than one-third, for the building would then appear top-heavy. The attic should have a very high plinth for its base, because if a small plinth is used it will be hidden by the projection of the cornice upon which it is built.


Pedestals and Balustrades
Plate 38
Joint of upper rail or cap
Approx. 1/6 H
Cap 1/4 H
Height divided into 12 equal parts
Sleeve
Belly 1/3 H
Base 1/4 H
1/2 H on ℄
Uncut Baluster
Pedestal
H = Height of Balustrade
Lower Rail
When a parapet is placed upon the entablature of a large building the plinth should be made extra high.
Approx. 1/3-1/4 height of building or order
Six Different Designs of Balustrades

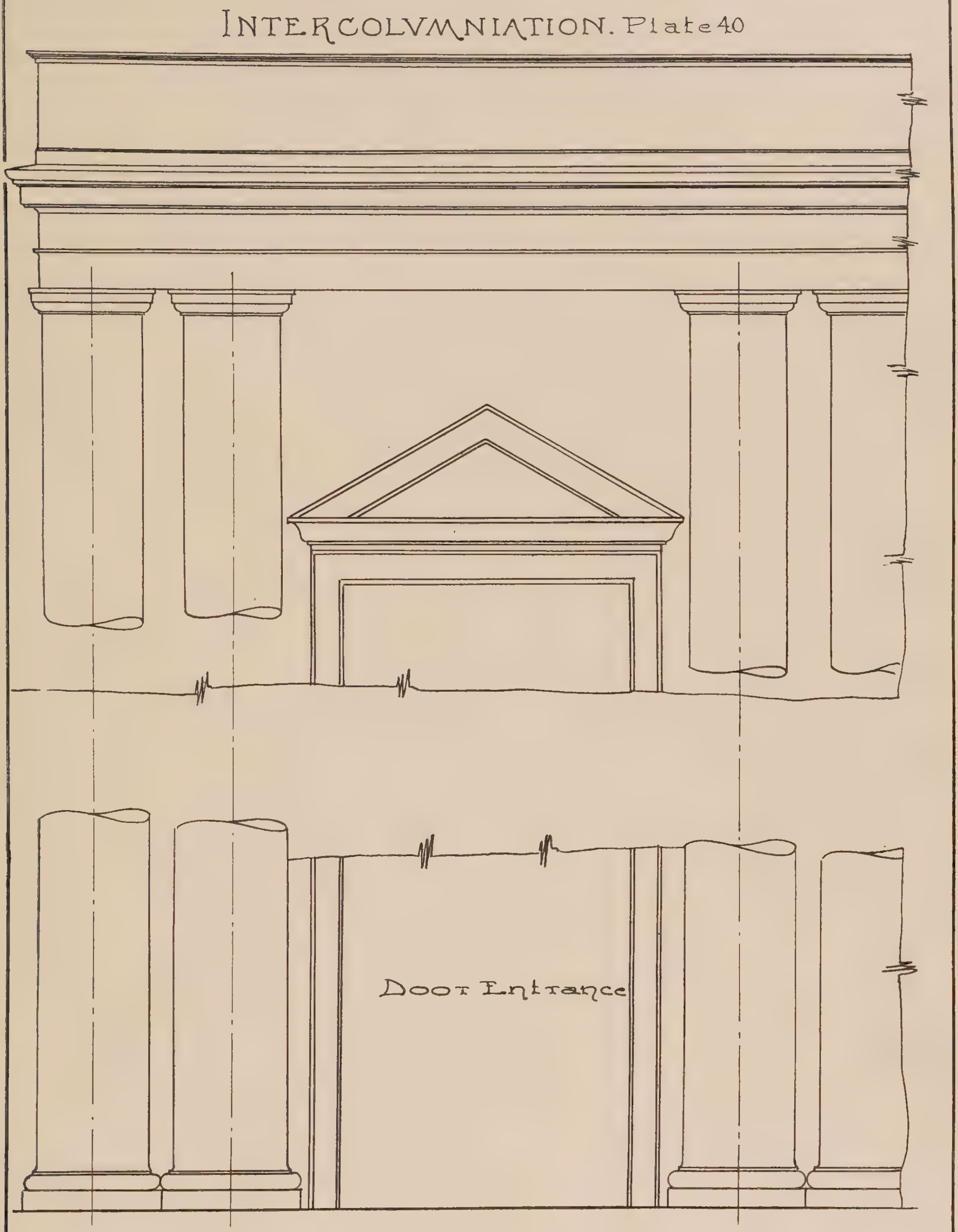
PEDIMENTS

A gable used in a building of one of the classic orders is called a pediment (see Plate 39). It consists of a triangular wall, the tympanum, placed upon the entablature of the cornice. The horizontal part is called the horizontal cornice, and the slanting part the raking cornice. The latter is generally constructed a little wider than the horizontal cornice.


PEDIMENTS
Plate 39
Cymativm - Raking Cornice
Tympanvm
Horizontal Cornice
CYMATIVM DETAILS
Cavetto Mld.
Ovolo Mld.
Cyma-reversa Mld.
Cyma-recta Mld.
DETAILS OF CYMA-RECTA MLD.
SECTION
PROFILE
INTERSECTION Mld
CIRCVLAR PEDIMENT
Rad

INTERCOLUMNIATION

The space between two consecutive columns in a range is called the intercolumniation (see Plate 40). This space is one diameter measurement less than the distance from the center of one column to the center of the next, or from the edge of one to the corresponding edge of the next. The term intercolumniation is also applied to the method of spacing between columns in a building. Varieties of intercolumniation are named according to the distance between two consecutive columns, being known as pycnostyle, systyle (two diameters apart), diastyle (three diameters apart), or areostyle.


INTERCOLVMNIATION. Plate 40
Door Entrance

PILASTERS

Pilasters do not generally diminish in width toward the top, and their capitals are generally drawn one-fifth wider than the column (see Plate 41). However, in some instances they are made half a sixth narrower than the column at the bottom and half a sixth wider at the top.

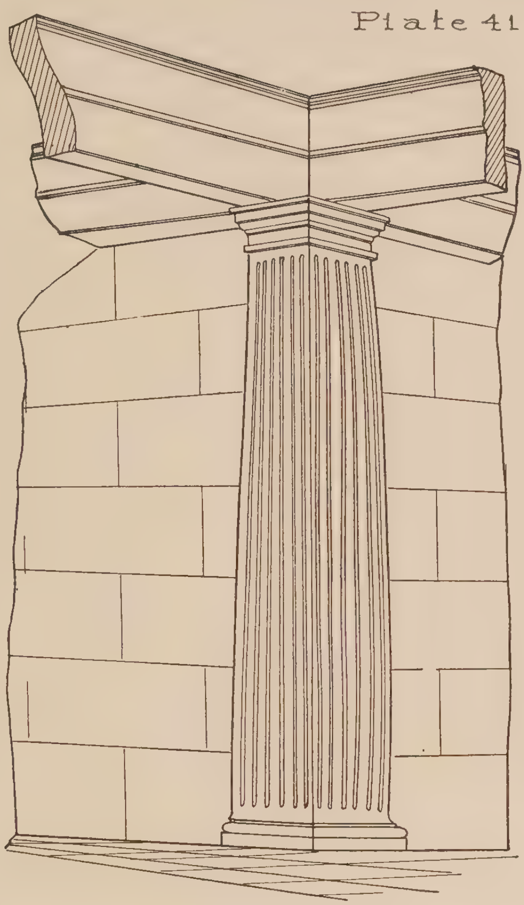
Pilasters generally project from the wall one-quarter of their diameter, their projection being determined by the load they carry.

A pilaster is frequently used in preference to a half-column on account of the small appearance of the latter.

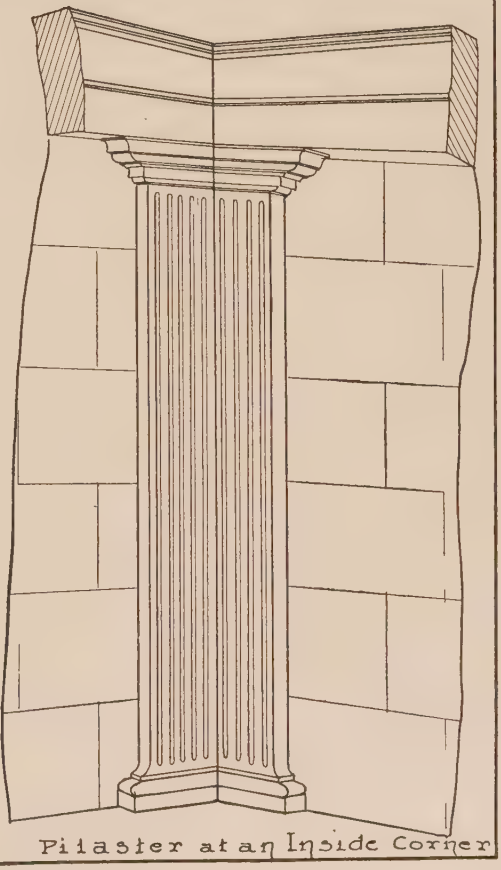
Pilasters

Plate 41

Note:-
For dimensions & detail of construction, see reference plate on notes.



Pilaster at a Corner

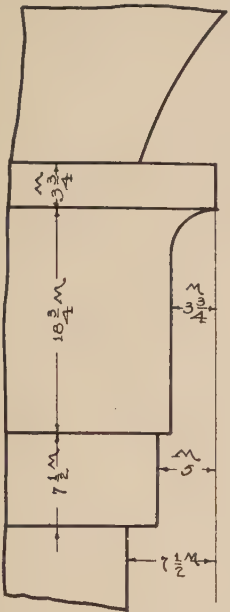


Pilaster at an Inside Corner

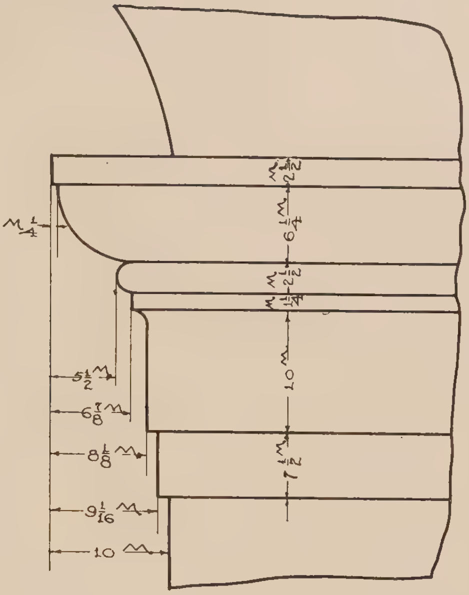
IMPOSTS

When arches are used they generally rest on imposts, which are posts with molded capitals (see Plate 42). The base of an impost is a square plinth, with or without a base mold. The moldings used on these piers or posts are usually taken from the Tuscan or Doric pilaster. In very large arches the imposts have a fully molded entablature without the frieze. The top of the post should come directly at the level of the center of the arch; but sometimes it is placed a little lower so that a full semi-circle may be drawn above it. In this case the arch is said to be stilted.

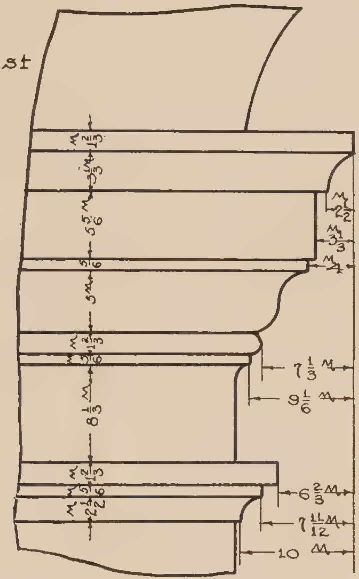
Imposts
Plate 42



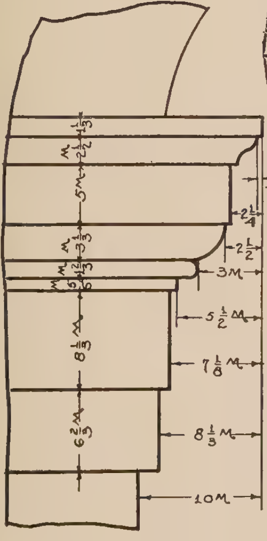
Tuscan Impost



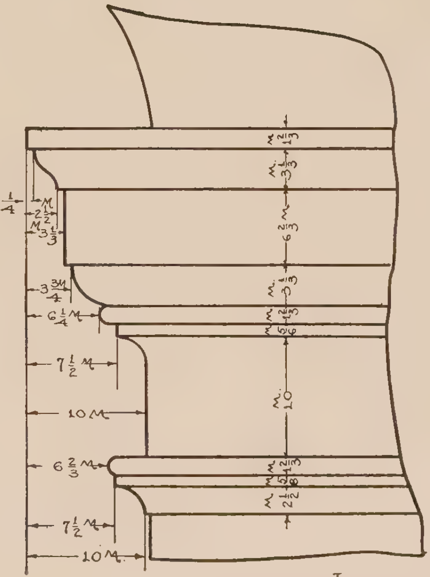
Doric Impost



Composite Impost



Ionic Impost



Corinthian Impost

ARCHES WITHOUT PEDESTALS

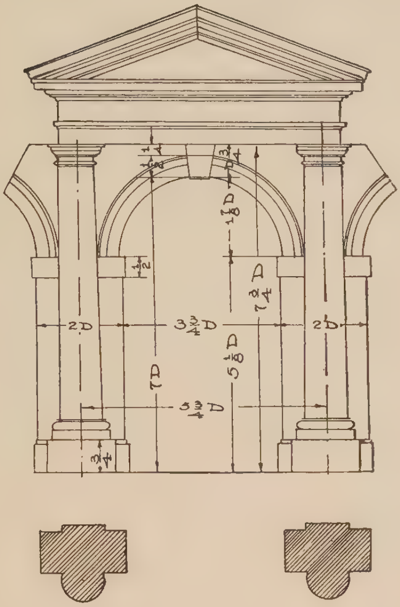
If an arch has no pedestal, the pilaster is made one-half the width of the pier, and the height the same as that of the archway (see Plate 43). The face of the pier or impost is one-half of the base diameter of the pilaster. In the Ionic Order the pier is about one-third as wide as the opening of the archway; and the rectangular part of the opening, between the piers or imposts, is two-thirds as wide as it is high. In the Tuscan and Doric Orders the opening of the archway is made a little wider; and in the Corinthian and Composite Orders, a little narrower, so as to be in proportion to the general design of the column.

ARCHES WITH PEDESTALS

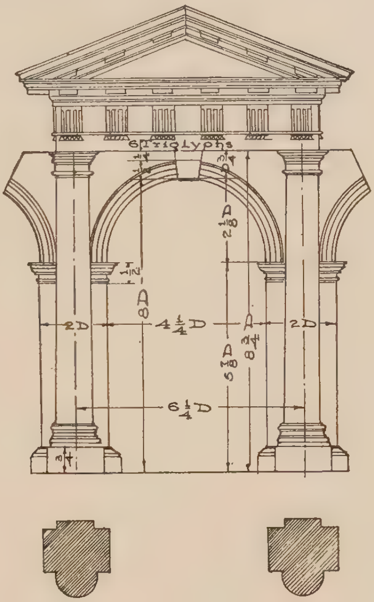
When a pedestal is used under the pilaster (see Plate 44) the general design and size of the archway remain the same; but, as the pedestal takes up about a quarter of the height, the scale of the entire column must be reduced one-fourth, the result being that the diameter of the shaft and the height of the pilaster and entablature are each only three-fourths as great as if no pedestal were used. The pilaster being narrower, the piers or imposts are made relatively wider, being five-eighths of the diameter of the pilaster. Piers with pedestals are therefore of slenderer proportions than those without pedestals.

Arches without Pedestals

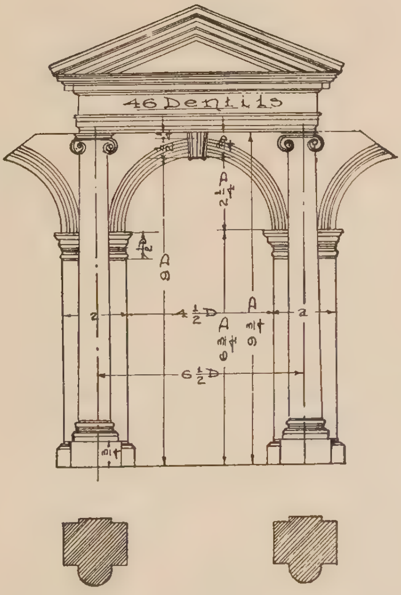
Plate 43



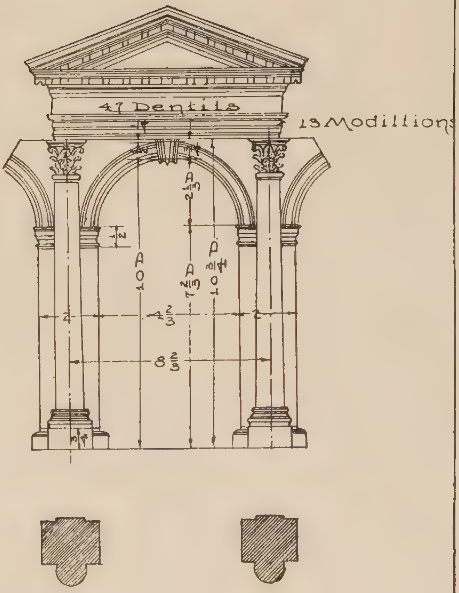
Tuscan



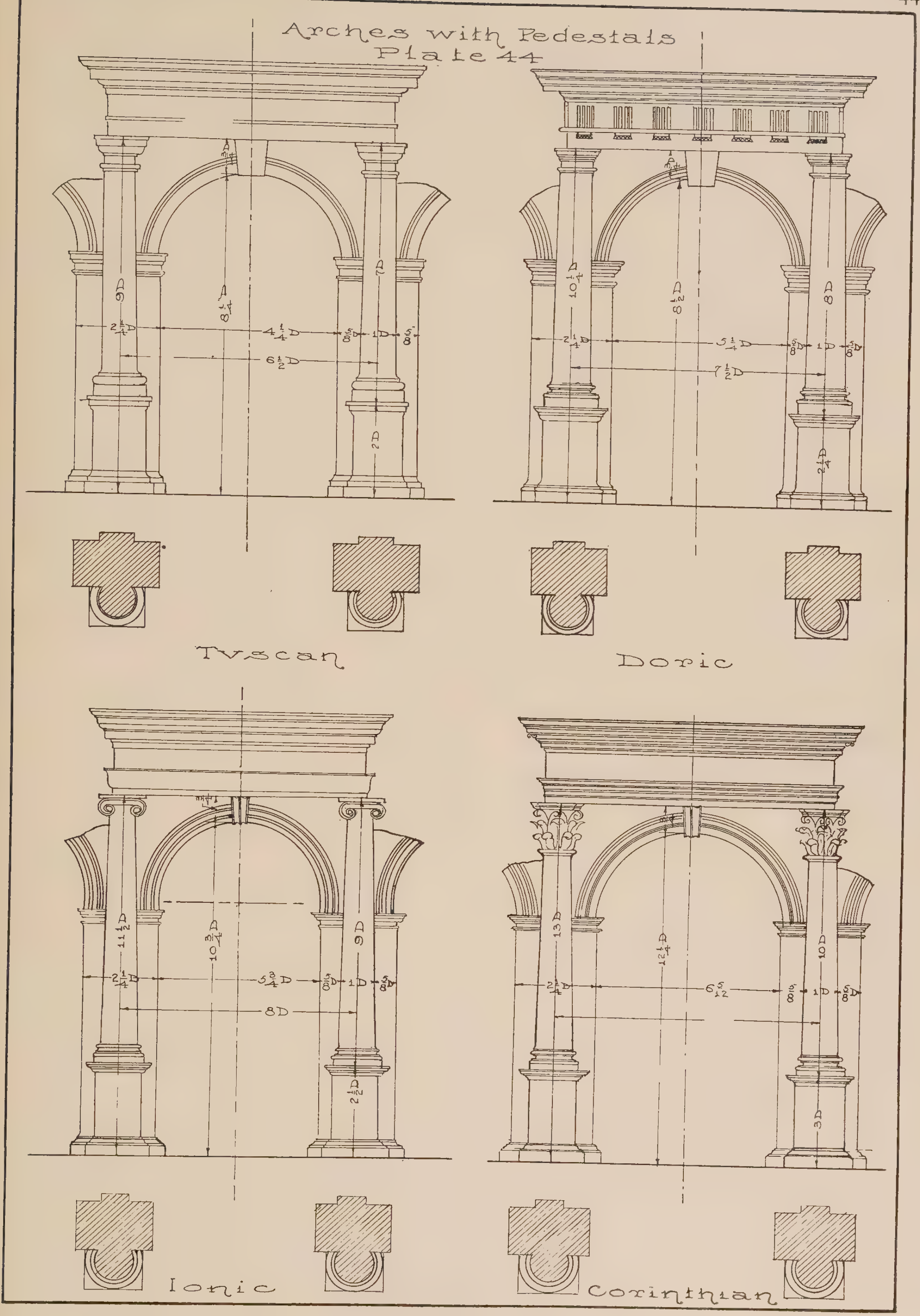
Doric



Ionic



Corinthian


Arches with Pedestals
Plate 44
3/4 D
9D
7D
8 1/4 D
2 1/4 D
4 1/4 D
5/8 D
1 D
5/8
6 1/2 D
2D
Tuscan
3/4 D
10 1/4 D
8 1/2 D
8D
2 1/4 D
5 1/4 D
5/8 D
1 D
5/8 D
7 1/2 D
2 1/4 D
Doric
11 1/2 D
10 3/4 D
9D
2 1/4 D
5 3/4 D
5/8 D
1 D
5/8 D
8D
2 1/2 D
Ionic
3/4
13 D
12 1/4 D
10 D
2 1/4 D
6 5/12
5/8
1 D
5/8 D
3D
Corinthian

EGYPTIAN ARCHITECTURE

While the Egyptian style is not included among the Classic Orders of Architecture, it deserves the attention of the student because of its great antiquity, the unique and striking character of its principal monuments, and the recurrence of its decorative forms in the art of later ages. The most ancient buildings in existence are to be found in Egypt; the pyramids, which are the tombs of early rulers of the country, were probably at least two thousand years old when the Parthenon was built.

The great works of the ancient Egyptians are almost entirely sepulchral in character. Because of their religious beliefs, these people attached great importance to the preservation of the body after death, and therefore lavished wealth and skill upon the preparation of their tombs. They have also left some magnificent temples, which differ in important respects from those of the Greeks and Romans. While the Greeks constantly strove for beauty and harmony, the ideals of the Egyptian architects seem to have been grandeur, simplicity, and, above all, permanence.

The Pyramids.—There are about a hundred pyramids (see Plate 45), of various shapes and sizes, in existence at the present time. Although the art of the architect is not displayed to any great extent in the design of these structures, their enormous size and the daring and skill shown in their construction entitle them to consideration in this volume.

Three of the pyramids surpass all the rest in size and are known by the names of their builders: the oldest and largest is that of Cheops (or, in the Egyptian language, *Khufu*); the second, that of Cephren (or *Khafra*); and the third, that of Mycerinos (or *Menkhara*). Many of the small pyramids are grouped around the large ones.

The base of the largest pyramid, that of Cheops, measures 764 feet on each side, and it has a height of 482 feet. It is constructed of limestone with a base of rocks, and is finished externally, as are the other two great pyramids, with a coating of polished granite stones. It contains three principal rooms and an elaborate system of inclined passageways, all made of finely polished granite and limestone. The sarcophagus is in an upper chamber, the terrific pressure of the mass of stones above being relieved by arches.

The other two great pyramids differ only in size, that of Cephren being 454 feet in height with a base 715 feet square. The pyramid of Mycerinos still retains its outer coating of pink granite. This pyramid is only 218 feet high and 253 feet square. A great number of pyramids are built of brick.

The Egyptian Empire has also left many tombs called mastabas. These are oblong structures of brick or stone, with inclined sides and flat roofs. In all cases they face the east and are divided into three parts: the temple, or chapel;

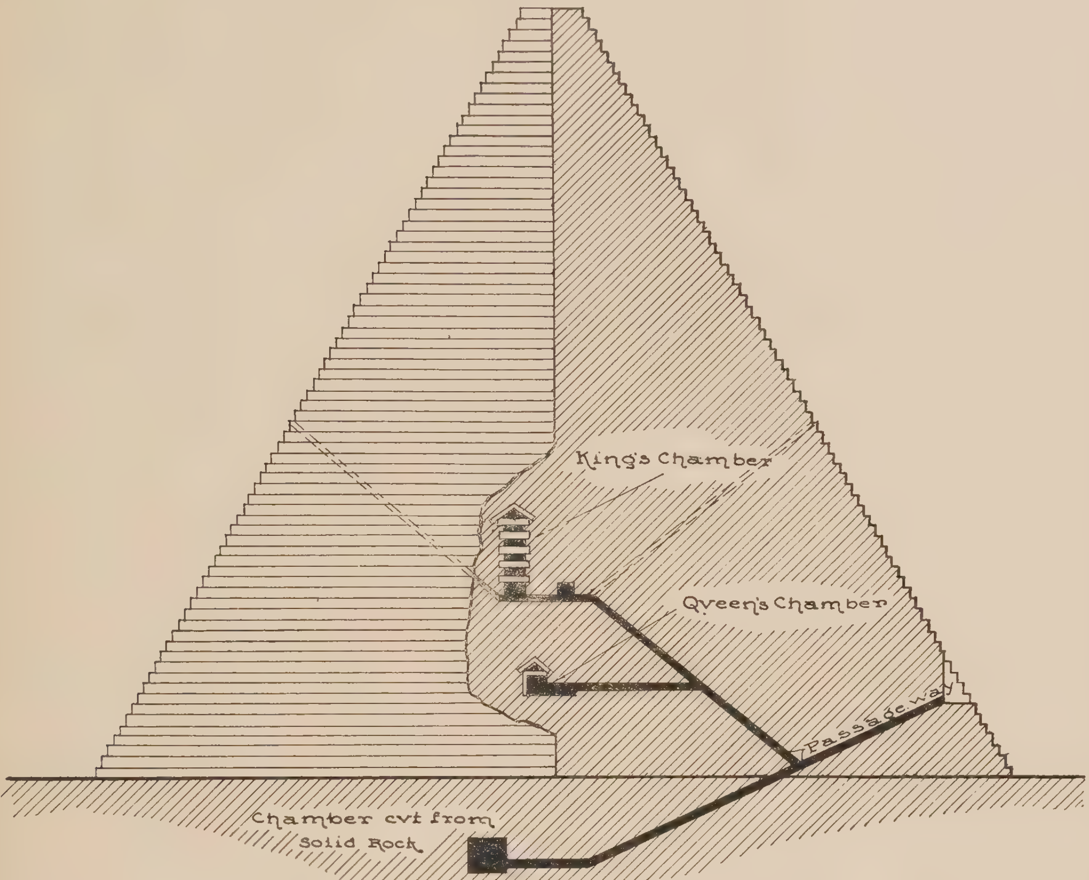
the serdabs; and the well. On the walls of the chapel, which is next to the entrance, are beautiful carvings and paintings, showing scenes in the life of the person for whom the tomb was built. The serdabs, or secret inner temple, contains a statue of the deceased. Beyond this is the well, which leads to the mummy temple underground. Many of these tombs are paneled and richly decorated with wooden symbols.

The Sphinx.—The Sphinx and the Sphinx Temple are also among the important monuments of ancient Egyptian Architecture. The Sphinx is a huge carving, cut from solid rock, representing a human head on a lion's body. For many years it was buried in sand. It is 189 feet long and 70 feet high and forms one of the most striking monuments of Egyptian Art.

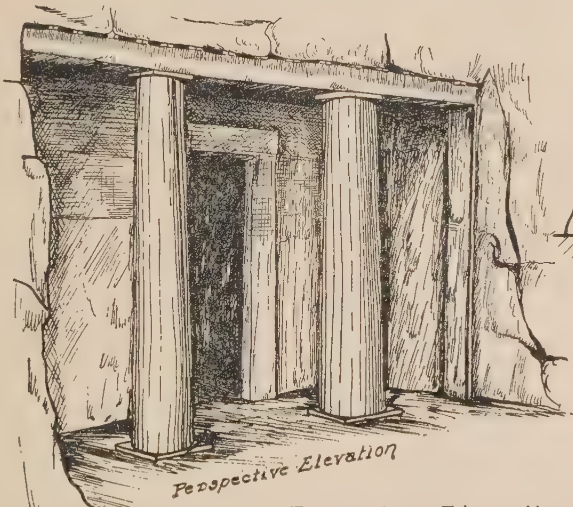
Close to the Sphinx is a temple which was previously thought to belong to it, but which was later proved to have been erected in connection with a pyramid. The hall of this temple is roofed with stone lintels carried on sixteen square monolithic piers, the sides of which are composed entirely of solid masonry and are destitute of all moldings both externally and internally.

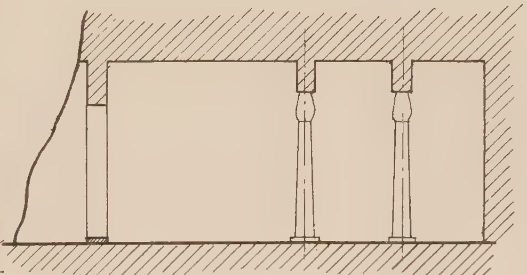
During the period known as the Middle Empire, two entirely different types of tombs were constructed. One type is structurally pyramidal in form and built of brick of moderate size, with very few decorations. The tombs of the second type are cut in the vertical cliffs on the banks of the Nile. The entrances to these tombs face the east, the farthest end being toward the land. Several of the tombs are decorated with mural paintings.

Egyptian Architecture.
The Pyramids
Plate 45

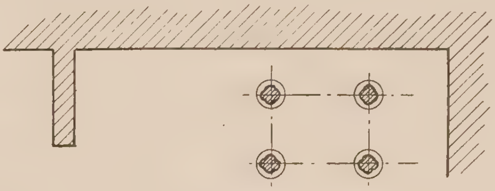


Section of the Great Pyramids.





Sectional Elevation



Plan

Perspective Elevation & Plan of Tomb at Beni Hassan

ANCIENT AND MODERN TERMS USED BY ARCHITECTS IN CONNECTION WITH THE ORDERS OF ARCHITECTURE

Abacus.—The upper member of the capital of a column. It is sometimes square and sometimes curved, forming, on the plan, segments of a circle called the arch of the abacus, and is commonly decorated with a rose or other ornament in the center, having the angles, called horns of the abacus, cut off in the direction of the radius or curve. In the Tuscan or Doric, it is a square tablet; in the Ionic, the edges are molded; in the Corinthian, its sides are concave and frequently enriched with carving. In Gothic pillars it has a great variety of forms.

Abutment.—That part of a pier from which the arch springs.

Acanthus.—A plant found in the south of Europe, representations of whose leaves are employed for decorating the Corinthian and Composite capitals. The leaves of the acanthus are used on the bell of the capital, and distinguish the two rich orders from the three others.

Acroteria.—The small pedestals placed on the extremities and apex of a pediment. They are usually without bases or plinths, and were originally intended to receive statues.

Alipterion.—In ancient Roman architecture, a room used by bathers for anointing themselves.

Amphiprostylos.—A Grecian temple that has a columned portico on both ends.

Amphitheater.—A double theater, of an elliptical form on the plan, for the exhibition of the ancient gladiatorial fights and other shows. Its arena or pit, in which those exhibitions took place, was encompassed with seats rising above each other, and the exterior had the accommodation of porticos or arcades for the public.

Ancones.—The consoles or ornaments cut on the keystones of arches or on the sides of door-cases. They are sometimes made use of to support busts or other figures.

Angle-capitals.—In Greek architecture, those Ionic capitals placed on the flank columns of a portico, which have one of their volutes placed horizontally at an angle of a hundred and thirty-five degrees with the plane of the frieze.

Annulated Columns.—Columns clustered together by rings or bands; much used in English architecture.

Annular Vault.—A vault rising from two parallel walls—the vault of a corridor. Same as *Barrel Vault.*

Annulet.—A small square molding used to separate others. The fillet that separates the flutings of a coulmn is sometimes known by this term.

Anta (*plural,* **Antæ**).—A name given to a pilaster when attached to a wall. Vitruvius calls pilasters parastatæ when insulated. They are not usually diminished, and in all Greek examples their capitals are different from those of the columns they accompany.

Antefixa.—In classical architecture (gargoyles, in Gothic architecture) the ornaments of lion's and other heads below the eaves of a temple, through channels in which, usually by the mouth, the water is carried from the eaves. By some this term is applied to the upright ornaments above the eaves in ancient architecture, which hid the ends of the Harmi or joint tiles.

Apophyge.—The lowest part of the shaft of an Ionic or Corinthian column, or the highest member of its base if the column be considered as a whole. The apophyge is the inverted cavetto or concave sweep, on the upper edge of which the diminishing shaft rests.

Areostyle.—That style of building in which the columns are distant from one another from four to five diameters. Strictly speaking, the term should be limited to intercolumniation of four diameters, which is only suited to the Tuscan order.

Areosystylos.—That style of building in which four columns are used in the space of eight diameters and a half; the central intercolumniation being three diameters and a half, and the others on each side being only half a diameter, by which arrangement coupled columns are introduced.

Arcade.—A range of arches, supported either on columns or on piers, and detached or attached to the wall.

Arch.—In building, a mechanical arrangement of building materials arranged in the form of a curve, which preserves a given form when resisting pressure, and enables them, supported by piers or abutments, to carry weights and resist pressure.

Arch-buttress.—Sometimes called a flying buttress; an arch springing from a buttress or pier.

Architrave.—That part of an entablature which rests upon the capital of a column, and is beneath the frieze.

Architrave Cornice.—An entablature consisting of an architrave and cornice, without the intervention of the frieze, sometimes introduced when it is inconvenient to give the entablature the usual height.

Arris.—The meeting of two surfaces producing an angle.

Astragal.—A small semi-circular molding, sometimes plain and sometimes ornamented.

Atlases, or Atlantes.—Figures or half-figures of men, used instead of columns or pilasters to support an entablature; called also *Telamones.*

Attached Columns.—Those that project three-fourths of their diameter from the wall.

Attic.—A low story above an entablature, or above a cornice which limits the height of the main part of an elevation. Although the term is evidently derived from the Greek, we find nothing exactly answering to it in Greek architecture; but it is very common in both Roman and Italian practice. What are otherwise called tholobates in St. Peter's and St. Paul's Cathedrals are frequently termed attics.

Attic Order.—A term used to denote the low pilasters employed in the decoration of an attic story.

Baluster.—A small pillar or column, supporting a rail, of various forms, used in balustrades.

Baluster Shaft.—The shaft dividing a window in Saxon architecture. At St. Albans there are some of these shafts, evidently out of the old Saxon church, which have been fixed up with Norman capitals.

Balustrade.—A series of balusters connected by a rail.

Band.—A sort of flat frieze or fascia running horizontally round a tower or other parts of a building, particularly the base tables in Perpendicular work, commonly used with the long shafts characteristic of the thirteenth century. It generally has a bold, projecting molding above and below, and is carved sometimes with foliages, but in general with cusped circles, or quatrefoils, in which frequently are shields of arms.

Band of a Column.—A series of annulets and hollows going around the middle of the shafts of columns, and sometimes of the entire pier. They are often beautifully carved with foliage, etc., as at Amiens. In several cathedrals there are rings of bronze apparently covering the junction of the frusta of the columns. At Worcester and Westminster they appear to have been gilt; they are there more properly called Shaft-rings.

Base Moldings.—The moldings immediately above the plinth of a wall, pillar, or pedestal.

Base of a Column.—That part which is between the shaft and the pedestal, or, if there be no pedestal, between the shaft and the plinth. The Grecian Doric had no base, and the Tuscan has only a single torus, or a plinth.

Basilica.—A term given by the Greeks and Romans to a public building devoted to judicial purposes.

Bead.—A circular molding. When several are joined, it is called Reeding; when flush with the surface, it is called Quirk-bead; and when raised, Cock-bead.

Beam.—A piece of timber, iron, stone, or other material, placed horizontally, or nearly so, to support a load over an opening, or from post to post.

Bell of a Capital.—In Gothic work, immediately above the necking is a deep hollow curve; this is called the bell of a capital. It is often enriched with foliage. It is also applied to the body of the Corinthian and Composite capitals.

Belt.—A course of stones or brick projecting from a brick or stone wall, generally placed in a line with the sills of the windows; it is either molded, fluted, plane, or enriched with patras at regular intervals. Sometimes called Stone String.

Buttress.—Masonry projecting from a wall, and intended to strengthen the same against the thrust of a roof or vault. Buttresses are no doubt derived from the classic pilasters which serve to strengthen walls where there is a pressure of a girder or roof-timber. In very early work they have little projection, and, in fact, are "strippilasters." In Norman work they are wider, with very little projection, and generally stop under a cornice or corbel table. Early English buttresses project considerably, sometimes with deep sloping weatherings in several stages, and sometimes with gabled heads. Sometimes they are chamfered, and sometimes the angles have jamb shafts. At Wells and Salisbury, England, they are richly paneled in stages, and often finished with niches and statues and elegantly carved and crocketed gablets, as at York, England. In the Perpendicular period the weatherings became waved, and they frequently terminate with niches and pinnacles.

Buttress, Flying.—A detached buttress or pier of masonry at some distance from a wall, and connected therewith by an arch or portion of an arch, so as to discharge the thrust of a roof or vault on some strong point.

Buttress Shafts.—Slender columns at the angle of buttresses, chiefly used in the Early English period.

Byzantine Architecture.—A style developed in the Byzantine Empire. The capitals of the pillars are of endless variety and full of invention; some are founded on the Greek

Corinthian, some resemble the Norman and the Lombard style, and are so varied that no two sides of the same capital are alike. They are comprised under the style Romanesque, which comprehends the round-arch style. Byzantine architecture reached its height in the Church of St. Sophia at Constantinople.

Capital.—The upper part of a column, pilaster, pier, etc. Capitals have been used in every style down to the present time. That mostly used by the Egyptians was bell-shaped, with or without ornaments. The Persians used the double-headed bell, forming a kind of bracket capital. The Assyrians apparently made use of the Ionic and Corinthian, which were developed by the Greeks, Romans, and Italians into their present well-known forms. The Doric was apparently an invention or adaptation by the Greeks, and was altered by the Romans and Italians. But in all these examples, both ancient and modern, the capitals of an order are all of the same form throughout the same building, so that if one be seen the form of all the others is known. The Romanesque architects altered all this, and in the carving of their capitals often introduced such figures and emblems as helped to tell the story of their building. Another form was introduced by them in the curtain capital, rude at first, but afterward highly decorated. It evidently took its origin from the cutting off of the lower angles of a square block, and then rounding them off. The process may be distinctly seen in its several stages, in Mayence Cathedral. But this form of capital was more fully developed by the Normans, with whom it became a marked feature. In the Early English capitals a peculiar flower of three or more lobes was used, spreading from the necking upward in most graceful forms. In Decorated and Perpendicular styles this was abandoned in favor of more realistic forms of crumpled leaves, enclosing the bell like a wreath. In each style bold abacus moldings were always used, whether with or without foliage.

Colonnade.—A row of columns. The colonnade is termed, according to the number of columns which support the entablature: tetrastyle, when there are four; hexastyle when six; octostyle, when eight, etc. When in front of a building they are termed porticos; when surrounding a building, peristyle; and when double or more, polystyle.

Column.—A round pillar. The parts are the base, on which it rests; its body, called the shaft; and the head, called the capital. The capital finishes with a horizontal table, called the abacus, and the base commonly stands on another, called the plinth. Columns may be either insulated or attached. They are said to be attached or engaged when they form part of a wall, projecting one-half or more, but not the whole, of their substance.

Composite Arch.—The pointed or lancet arch.

Composite Order.—The most elaborate of the Classic Orders of Architecture.

Compound Arch.—A usual form of medieval arch, which may be resolved into a number of concentric archways, successively placed within and behind each other.

Conge.—Another name for the echinus or quarter-round.

Coping.—The capping or covering of a wall. This is of stone, weathered to throw off the wet. In Norman times, as far as can be judged from the little there is left, it was generally plain and flat, and projected over the wall with a floating to form a drip. Afterward it assumed a torus or bowtel at the top, and became deeper, and in the Decorated period there were generally several sets-off. The copings in the Perpendicular period assumed something of the wavy section of the buttress caps, and were mitered around the sides of the embrasure as well as the top and botton.

Corbel.—The name, in medieval architecture, for a piece of stone jutting out of a wall to carry any superincumbent weight. A piece of timber projecting in the same way was called a tassel or a bragger. Thus, the carved ornaments from which the vaulting shafts spring at Lincoln are corbels. Norman corbels are generally plain. In the Early English period they are sometimes elaborately carved. They sometimes end with a point, apparently growing into the wall, or forming a knot, and often are supported by angles and other figures. In the later periods the foliage or ornaments resemble those in the capitals. In modern architecture, a short piece of stone or wood projecting from a wall to form a support, generally ornamented.

Corbel Out.—To build out one or more courses of brick or stone from the face of a wall, to form a support for timbers.

Corbel Table.—A projecting cornice or parapet, supported by a range of corbels a short distance apart, which carry a molding above which is a plain piece of projecting wall forming a parapet, and covered by a coping. Sometimes small arches are thrown across from corbel to corbel, to carry the projection.

Corona.—The brow of the cornice which projects over the bed moldings to throw off the water.

Coupled Columns.—Columns arranged in pairs.

Cove, or Coving.—The molding called the cavetto, or the scotia inverted, when introduced on a large scale, and not as a mere molding in the composition of a cornice.

Curb Roof, or Mansard Roof.—A roof formed of four contiguous planes, each two having an external inclination.

Cyma.—The name of a molding of very frequent use. It is a simple, waved line, concave at one end and convex at the other, like an italic *f*. When the concave part is uppermost it is called a cyma-recta, but if the convexity appear above, and the concavity below, it is then a cyma-reversa.

Cymatium.—When the crowning molding of an entablature is of the cyma form it is termed the cymatium.

Dentil.—The cogged or toothed member, common in the bed mold of a Corinthian entablature, is said to be dentiled, and each cog or tooth is called a dentil.

Depressed Arches, or Drop Arches.—Those of less pitch than the equilateral.

Diastyle.—A spacious intercolumniation, to which three diameters are assigned.

Distyle.—A portico of two columns. This is not generally applied to the mere porch with two columns, but to describe a portico with two columns *in antis*.

Ditriglyph.—An intercolumniation in the Doric Order, of two triglyphs.

Dodecastyle.—A portico of twelve columns in front. The lower one of the west front of St. Paul's Cathedral, London, is of twelve columns, but they are coupled, making the arrangement pseudo-dodecastyle. The Chamber of Deputies in Paris has a true dodecastyle.

Doric Order.—The oldest of the three orders of Grecian Architecture.

Double Vault.—One formed by a duplicate wall. Wine cellars are sometimes so formed.

Echinus.—A molding of eccentric curve, generally cut (when it is carved) into the forms of eggs and anchors alternating, whence the molding is called by the name of the more conspicuous. It is the same as *Ovolo*.

Egyptian Architecture.—The earliest civilization and cultivation of the arts was in Upper Egypt. The most remarkable and most ancient monuments of the Egyptians, with the exception of the pyramids, are nearly all included in Upper Egypt. The buildings of Egypt are characterized by solidity and massiveness of construction, originality of conception, and boldness of form. The walls, the pillars, and the most sacred places of their religious buildings were ornamented with hieroglyphics and symbolical figures, while the ceilings of the porticos exhibited zodiacs and celestial planispheres. The temples of Egypt were generally without roofs, and, consequently, the interior colonnades had no pediments, supporting merely an entablature, composed of only architrave, frieze, and cornice, formed of immense blocks united without cement and ornamented with hieroglyphics.

Entablature.—The assemblage of parts supported by the column. It consists of three parts: the architrave, frieze, and cornice.

Entail.—In Gothic architecture, delicate carving.

Entasis.—The swelling of a column, etc. In medieval architecture, some spires, particularly those called "broach spires," have a slight swelling in the sides, but no more than to make them look straight; for, from a particular "*deceptio visus*," that which is quite straight, when viewed at a height, looks hollow.

Epistyle.—This term may with propriety be applied to the whole entablature, with which it is synonymous; but it is restricted in use to the architrave, or lowest member of the entablature.

Eustyle.—A species of intercolumniation to which a proportion of two diameters and a quarter is assigned. This term, together with the others of similar import—pycnostyle, systyle, diastyle, and areostyle—referring to the distance of columns from one another in composition, is from Vitruvius, who assigns to each the space it is to express. It will be seen, however, by reference to them individually, that the words themselves, though perhaps sufficiently applicable, convey no idea of an exactly defined space, and, by reference to the columnar structures of the ancients, that no attention was paid by them to such limitations. It follows, then, that the proportions assigned to each are purely conventional, and may or may not be attended to without vitiating the power of applying the terms. Eustyle means the best or most beautiful arrangement; but, as the effect of a columnar composition depends on many things besides the diameter of the columns, the same proportioned intercolumniation would look well or ill according to those other circumstances, so that the limitation of Eustyle to two diameters and a quarter is absurd.

Extrados.—The exterior or convex curve forming the upper line of the arch stones; the term is opposed to the intrados, or concave side.

Fascia.—A flat, broad member in the entablature of columns or other parts of buildings, but of small projection. The architraves in some of the orders are composed of three bands, or fasciæ; the Tuscan and Doric should have only one. Ornamental projections from the walls of brick buildings over any of the windows, except the uppermost, are called *Fasciæ*.

Fillet.—A narrow vertical band or listel of frequent use in congeries of moldings, to separate and combine them, and also to give breadth and firmness to the upper edge of a crowning cyma or cavetto, as in an external cornice. The narrow slips or breadth between the flutes of Corinthian and Ionic columns are also called fillets. In medieval work the fillet is a small, flat, projecting square, chiefly used to separate hollows and rounds, and often found in the outer parts of shafts and bowtels. In this situation the center fillet has been termed a keel, and the two side ones, wings; but, apparently, this is not an ancient usage.

Flute.—A concave channel. Columns whose shafts are channeled are said to be fluted, and the flutes are collectively called *Flutings.*

Footings.—The spreading courses at the base or foundation of a wall. When a layer of different material from that of the wall (as a bed of concrete) is used, it is called the *Footing.*

Foundation.—That part of a building or wall which is below the surface of the ground.

Frieze.—That portion of an entablature between the cornice above and architrave below. It derives its name from being the recipient of the sculptured enrichments either of foliage or figures which may be relevant to the subject of the sculpture. The frieze is also called the *Zoöphorus.*

Gable.—When a roof is not hipped or returned on itself at the ends, its ends are stopped by carrying up the walls under them in the triangular form of the roof itself. This is called the gable, or, in the case of the ornamental and ornamented gable, the pediment. Of necessity, gables follow the angles of the slope of the roof, and differ in the various styles. In Norman work they are generally about half-pitch; in Early English, seldom less than equilateral, and often more. In Decorated work they become lower, and still more so in the Perpendicular style. In all important buildings they are finished with copings or parapets. In the Later Gothic styles gables are often surmounted with battlements, or enriched with crockets. They are also often paneled or perforated, sometimes very richly. The gables in ecclesiastical buildings are mostly terminated with a cross; in others by a finial or pinnacle. In later times the parapets or copings were broken into a sort of steps, called corbic steps. In buildings of less pretension the tiles or other covering passed over the front of the wall, which then, of course, had no coping. In this case, the outer pair of rafters were concealed by molded or carved verge boards.

Gambrel Roof.—A roof with two pitches, similar to a mansard or curb roof.

Gothic Style.—The name of Gothic was given to the various medieval styles at a period in the sixteenth century when a great classic revival was going on, and everything not classic was considered barbarian, or Gothic. The term was thus originally intended as one of stigma, and, although it conveys a false idea of the character of the medieval styles, it has long been used to distinguish them from the Grecian and Roman. The true principle of Gothic Architecture is the vertical division, relation, and subordination of the different parts, distinct and yet at unity with each other; and while this principle was adhered to, Gothic Architecture may be said to have retained its vitality.

Grange.—A word derived from the French, signifying a large barn or granary. Granges were usually long buildings with high wooden roofs, sometimes divided by posts or columns into a sort of nave and aisles, with walls strongly buttressed. In England the term was applied not only to the barns, but to the whole of the buildings which formed the detached farms belonging to the monasteries; in most cases there was a chapel either included among these or standing apart as a separate edifice.

Groin Arch.—The cross-rib in the later styles of groining, passing at right angles from wall to wall, and dividing the vault into bays or travees.

Grouped Columns.—Three, four, or more columns put together on the same pedestal. When two are placed together, they are said to be coupled.

Height of an Arch.—A line drawn from the middle of the chord to the intrados.

Helix.—A small volute or twist, like a stalk, representing the twisted tops of the acanthus, placed under the abacus of the Corinthian capital.

Hip Roof.—A roof that rises by equally inclined planes from all four sides of the building.

Hips.—The pieces of timber placed in an inclined position at the corners or angles of a hip roof.

Impost.—A term in Classic Architecture for the horizontal moldings of piers or pilasters, from the top of which spring the archivolts or moldings which go round the arch.

In Antis.—Having two columns between the antæ of the lateral walls and the cella.

Intercolumniation.—The distance from column to column; the clear space between columns.

Interlaced Arches.—Arches that cut or intersect each other, one passing over two openings.

Intrados.—The inner or concave curve of the arch stones.

Ionic Order.—One of the Classic Orders of Architecture.

Keystone.—The stone placed in the center of the top of an arch. The character of the keystone varies in different orders. In the Tuscan and Doric it is only a simple stone projecting beyond the rest; in the Ionic it is adorned with moldings in the manner of a console; in the Corinthian and Composite it is a richly sculptured console.

Lip Mold.—A molding of the Perpendicular period, like a hanging lip.

List, or Listel.—A little square molding, to crown a larger; also termed a fillet.

Lombard Architecture.—A name given to the round-arched architecture of Italy, which was introduced by the conquering Goths and Ostrogoths and superseded the Romanesque. It reigned between the eighth and twelfth centuries, during the time that the Saxon and Norman styles were in vogue in England, and corresponded to them in its development into the Continental Gothic.

Mansard Roof.—A curb roof, invented by François Mansard, a distinguished French architect, who died in 1666.

Mausoleum.—A magnificent tomb or sumptuous sepulchral monument.

Members.—The different parts of a building, the different parts of an entablature, the different moldings of a cornice, etc.

Merlon.—That part of a parapet which lies between two embrasures.

Metope.—The square recess between the triglyphs in a Doric frieze. It is sometimes occupied by sculptures.

Minute.—The sixtieth part of the lower diameter of a column; it is the measure used by architects to determine the proportions of an order.

Modillion.—The enriched block or horizontal bracket generally found under the cornice of the Corinthian entablature; so called because of its arrangement in regulated distances. Less ornamented, it is sometimes used in the Ionic.

Module.—This is a term which has been generally used by architects in determining the relative proportions of the various parts of a columnar ordinance. The semi-diameter of the column at its base is the module. This is divided into thirty parts, called minutes; and any part of the composition is said to be of so many modules and minutes, or minutes alone, in height, breadth, or projection. The whole diameter is now generally preferred as a module, being a better rule of proportion than its half.

Monotriglyph.—The intercolumniations of the Doric Order are determined by the number of triglyphs which intervene, instead of the number of diameters of the column, as in other cases; and this term designates the ordinary intercolumniation of one triglyph.

Molding.—When any work is wrought into long regular channels or projections, forming curves or rounds, hollows, etc., it is said to be molded, and each separate member is called a molding. In medieval architecture the principal moldings are those of the arches, doors, windows, piers, etc. In the Early English style, the moldings, for some time, formed groups set back in squares, and frequently very deeply undercut. The scroll molding is also common. Small fillets now become very frequent in the keel molding, which is so called from its resemblance in section to the bottom of a ship; sometimes, also, it has a peculiar hollow on each side, like two wings. Later, in the Decorated style, the moldings are more varied in design, though hollows and rounds still prevail. The undercutting is not so deep; fillets abound; ogees are more frequent; and the wave mold, double ogee, or double ressaunt, is often seen. In many places the strings and labels are a round, the lower half of which is cut off by a plain chamfer. The moldings in the later styles in some degree resemble those of the Decorated, flattened and extended; they run more into one another, having fewer fillets, and being, as it were, less grouped. One of the principal features of the change is the substitution of one, or perhaps two (seldom more), very large hollows in the set of moldings. These hollows are neither circular nor elliptical, but obovate, like an egg cut across, so that one half is larger than the other. The brace mold also has a small bead, where the two ogees meet. Another sort of molding, which has been called a lip mold, is common in parapets, bases, and weatherings.

Mullion, Munion.—The perpendicular pieces of stone, sometimes like columns, sometimes like slender piers, which divide the bays or lights of windows or screen-work from each other. In all styles, in less important work, the mullions are often simply plain chamfered, and more commonly have a very flat hollow on each side. In larger buildings there is often a bead or bowtel on the edge, and often a single very small column with a capital. As tracery grew richer, the windows were divided by a larger order of mullion, between which came a lesser or subordinate set of mullions, which ran into each other. The term is also applied to a wood or iron division between two windows.

Mutule.—The rectangular impending block under the corona of the Doric cornice, from which guttæ, or drops, depend. Mutule is equivalent to modillion, but the latter term is applied more particularly to enriched blocks or brackets, such as those of Ionic and Corinthian entablatures.

Necking.—The annulet or round, or series of horizontal moldings, which separate the capital of a column from the plain part or shaft.

Obelisk.—A lofty pillar of stone, of a rectangular form, diminishing toward the top, and generally ornamented with inscriptions and hieroglyphics. Obelisks were much used by the ancient Egyptians.

Octostyle.—A portico of eight columns in front.

Order.—A column with its entablature and stylobate. The term is the result of the dogmatic laws deduced from the writings of Vitruvius, and has been exclusively applied to those arrangements which they were thought to warrant.

Orthostyle.—A columnar arrangement in which the columns are placed in a straight line.

Ovolo.—Same as *Echinus*.

Parapet.—A dwarf wall along the edge of a roof, or around a terrace walk, etc., to prevent persons from falling over, and as a protection to the defenders in case of a siege. Parapets are plain, embattled, perforated, or paneled. The last two are found in all styles except the Norman. Plain parapets are simply portions of the wall, generally overhanging a little, with coping at the top and corbel table below. Embattled parapets are sometimes paneled, but oftener pierced for the discharge of arrows, etc. Perforated parapets are pierced in various devices—as circles, trefoils, quartrefoils, and other designs—so that the light is seen through. Paneled parapets are those ornamented by a series of panels, either oblong or square, and more or less enriched, but are not perforated. These are common in the Decorated and Perpendicular periods.

Pedestal.—The square support of a column, statue, etc.; the base or lower part of an order of columns. A pedestal consists of a plinth for a base, the die, and a talon crowned for a cornice. When the height and width are equal, it is termed a square pedestal; one that supports two columns is a double pedestal; and one that supports a row of columns without any break is a continued pedestal.

Pediment.—A low triangular crowning, ornamented, in front of a building, and over doors and windows. Pediments are sometimes made in the form of a segment; the space enclosed within the triangle is called the tympanum. The term pediment is also applied to the gable end of a classic building, where the horizontal cornice is carried across the front, forming a triangle with the end of the roof.

Pendent.—A name given to an elongated boss, either molded or foliated, such as hangs down from the intersection of groins, expecially in fan tracery, or at the end of hammer beams. Sometimes long corbels, under the wall pieces, have been so called. The name has also been given to the large masses depending from enriched ceilings, in the later works of the Pointed style.

Pendent Posts.—A name given to those timbers that hang down the side of a wall from the plate in hammer-beam trusses, and receive the hammer braces.

Pendentive.—A name given to an arch that cuts off, as it were, the corners of a square building internally, so that the superstructure may become an octagon or a dome. In medieval architecture these arches, when under a spire in the interior of a tower, are called *Squinches*.

Pendentive Bracketing, or Cove Bracketing.—Bracketing springing from the rectangular walls of an apartment upward to the ceiling, and forming the horizontal part of the ceiling into a circle or ellipse.

Pentastyle.—Having five columns in front.

Pent-roof.—A roof with a slope on one side only.

Peristyle.—A range of columns encircling an edifice, such as that which surrounds the cylindrical drum under the cupola of St. Paul's. The columns of a Greek peripteral temple form a peristyle also, the former being a circular, and the latter a quadrilateral peristyle.

Perpendicular Style.—The third and last of the Pointed or Gothic styles; also called the Florid style.

Pilasters.—Flat square columns, attached to a wall, behind a column, or along the side of a building, and projecting from the wall about a fourth or a sixth part of their breadth. The Greeks had a slightly different design for the capitals of pilasters, and made them the same width at top as at bottom; but the Romans gave them the same capitals as the columns, and made them of diminished width at the top, similar to the columns.

Pillar, or Pyller.—A word generally used to denote the round or polygonal piers, or those surrounded with clustered columns, which carry the main arches of the building. Saxon and Early Norman pillars are generally stout cylindrical shafts built up of small stones. Sometimes, however, they are quite square; sometimes with other squares breaking out of them (this is more common in French and German work); sometimes with angular shafts; and sometimes they are plain octagons. In Romanesque Norman work the pillar is sometimes square, with two or more semi-circular or half columns attached. In the Early English period the pillars become loftier and lighter, and in most important buildings are a series of clustered columns, frequently of marble, placed side by side, sometimes set at intervals around a circular center, and sometimes almost touching each other. These shafts are often wholly detached from the central pillar, though grouped around it, in which case they are almost always of Purbeck or Bethersden marbles. In Decorated work the shafts on plan are very often placed around a square set anglewise, or a lozenge, the long way down the nave; the center or core itself is often worked into hollows or other moldings, to show between the shafts, and to form part of the composition. In this and the latter part of the previous style there is generally a fillet on the outer part of the shaft, forming what has been called a keel molding. Pillars are often, as it were, tied together by bands formed of rings of stone and sometimes of metal. The small pillars at the jambs of doors and windows, and in arcades, and also those slender columns attached to pillars, or standing detached, are generally called shafts.

Planceer.—Sometimes used in the same sense as soffit, but more correctly applied to the soffit of the corona in a cornice.

Plinth.—The square block at the base of a column or pedestal. In a wall, the term plinth is applied to the projecting base or water table, generally at the level of the first floor.

Polytriglyph.—An intercolumniation in the Doric Order of more than two triglyphs.

Prostyle.—A portico in which the columns project from the building to which it is attached.

Quirk Moldings.—The convex part of Grecian moldings when they recede at the top, forming a reëntrant angle with the surface which covers the moldings.

Quoins.—Large squared stones at the angles of buildings, buttresses, etc., generally used to stop the rubble or rough stone work, and to make the angles true and stronger. Saxon quoin stones are said to have been composed of one long and one short stone alternately. Early quoins are generally roughly axed; in later times they had a draught tooled by the chisel round the outside edges, and later still were worked fine with the saw.

Rafters.—The joists to which the roof boarding is nailed. Principal rafters are the upper timbers in a truss, having the same inclination as the common rafters.

Ridge.—The top of a roof that rises to an acute angle.

Ridge-pole.—The highest horizontal timber in a roof, extending from top to top of the several pairs of rafters of the trusses, for supporting the heads of the jack rafters.

Rilievo, or Relief.—The projection of an architectural ornament.

Roof.—The covering or upper part of any building.

Roofing.—The material put on a roof to make it water-tight.

Scotia.—A concave molding, most commonly used in bases, which projects a deep shadow on itself, and is thereby a most effective molding under the eye, as in a base. It is like a reversed ovolo, or, rather, what the mold of an ovolo would be.

Soffit.—The lower horizontal face of anything as, for example, of an entablature resting on, and lying open between, the columns, or the under face of an arch where its thickness is seen.

Stereobate.—A basement, distinguished from the nearly equivalent term stylobate by the absence of columns.

Straight Arch.—A form of arch in which the intrados is straight, but with its joints radiating as in a common arch.

Style.—The term style in architecture has obtained a conventional meaning beyond its simpler one, which applies only to columns and columnar arrangements. It is now used to signify the differences in the moldings, general outlines, ornaments, and other details which exist between the works of various nations, and also those differences which are found to exist between the works of any nation at different times.

Stylobate.—A basement to columns. Stylobate is synonymous with pedestal, but is applied to a continued and unbroken substructure or basement to columns, while the latter term is confined to insulated supports. The Greek temples generally had three or more steps all around the temple, the base of the column resting on the top step; this was the *Stylobate.*

Surbase.—A cornice or series of moldings on the top of the base of a pedestal, podium, etc.; a molding above the base.

Systyle.—An intercolumniation to which two diameters are assigned.

Tetrastyle.—A portico of four columns in front.

Tholobate.—That on which a dome or cupola rests. This is a term not in general use, but it is none the less of useful application. What is generally termed the attic above the peristyle and under the cupola of St. Paul's, London, would be correctly designated the tholobate. A tholobate of a different description, and one to which no other name can well be applied, is the circular substructure to the cupola of the University College, London.

Triglyph.—The vertically channeled tablets of the Doric frieze are called triglyphs, because of the three angular channels in them—two perfect and one divided—the two chamfered angles or hemiglyphs being reckoned as one. The square sunk spaces between the triglyphs on a frieze are called *Metopes.*

Tuscan Order.—The plainest of the five Classic Orders of Architecture.

Vault.—An arched ceiling or roof. A vault is, indeed, a laterally conjoined series of arches. The arch of a bridge is, strictly speaking, a vault. Intersecting vaults are said to be groined. See *Groined Vaulting* for fuller description of vaults.

Volute.—The convolved or spiral ornament which forms the characteristic of the Ionic capital. Volute, scroll, helix, and cauliculus are used indifferently to denote the angular horns of the Corinthian capital.

INDEX

A

Abacus, 9, 125
Abutment, 125
Acanthus, 125
Acroteria, 125
Alipterion, 125
Amphiprostylos, 125
Amphitheater, 125
Ancones, 125
Angle-capitals, 125
Annular vault, 125
Annulated column, 125
Annulet, 125
Annulet molding, 3
Anta, 125
Antefixa, 125
Apollo Epikourios, Temple of, 2
Apophyge, 126
Arcade, 2, 11, 126
Arch, 2, 126
Arch-buttress, 126
Arches, with pedestals, 115
    Corinthian Order, 119
    Doric Order, 119
    Ionic Order, 119
    Tuscan Order, 119
  without pedestals, 115
    Corinthian Order, 117
    Doric Order, 117
    Ionic Order, 117
    Tuscan Order, 117
Architrave, 2, 9, 13, 26, 126
  Composite, 31
  Corinthian, 26, 31
  Doric, 26, 31
  Ionic, 26, 31
  Tuscan, 26, 31
Architrave cornice, 126
Areostyle, 126
Areosystylos, 126
Arris, 126
Astragal, 3, 126
Atlantes, 126
Atlases, 126
Attached column, 126
Attic, 95, 126
Attic Order, 126

B

Baluster shaft, 126
Balusters, 95, 97, 126
Balustrade, 126
Band, 3, 127
  of a column, 127
Base, 9, 95
  Doric, 26, 33
  molding, 127
  of a column, 127
  Tuscan, 26, 33
Basilica, 127
Bead, 3, 23, 26, 33, 127
Beam, 127
Bell of a capital, 127
Belt, 127
Bird's-beak, 3, 17
Bowtel molding, 23
Brace, 23
Buttress, 127
  flying, 127
  shaft, 127
Byzantine Architecture, 127

C

Capital, 1, 9, 37, 128
  Doric, 26, 33
  Tuscan, 26, 33
Cavetto molding, 3, 17, 23
Classic Orders of Architecture, 1
Colonnade, 2, 11, 128
Column, 1, 9, 26, 35, 37, 128
Comparison of orders, 39
Composite arch, 128
Composite Order, 3, 79, 81, 83, 85, 128
Compound arch, 128
Conge molding, 23, 33, 128
Coping, 128
Corbel, 129
Corbel out, 129
Corbel table, 129
Corinthian Order, 3, 63, 64, 65, 67, 69, 71, 73, 75, 77
Cornice, 1, 5, 9
Cornices, Corinthian, 25, 27
  Doric, 25, 27
  horizontal, 101

Cornices, Ionic, 25, 27
  raking, 101
  Tuscan, 25, 27
Corona, 1, 5, 13, 129
Coupled columns, 129
Cove mold, 3, 17, 129
Curb roof, 129
Cyma, 129
Cyma-recta mold, 3, 17, 23
Cyma-reversa mold, 3, 17, 19, 23
Cymatium, 3, 13, 129
  inverted, 3

D

Dentils, 129
  Composite, 25, 29
  Corinthian, 25, 29
  Doric, 25, 29
  Ionic, 25, 29
Depressed arches, 129
Diastyle, 129
Die, 1, 9
Distyle, 129
Ditriglyph, 129
Dodecastyle, 129
Doric Order, 23, 45, 46, 47, 49, 53, 129
Double vault, 129
Dull bead, 23

E

Eaves, 1, 5
Echinus, 3, 17, 129
Egyptian Architecture, 121–123, 129
Egyptian tombs, 121, 123
Ellipse, 15
Entablature, 2, 13, 83, 130
Entail, 130
Entasis, 35, 130
Epistyle, 2, 130
Erechtheum, 2
Eustyle, 130
Extrados, 2, 13, 130

F

Fascia, 130
Fillet, 3, 23, 26, 130
Floor, 1
Flute, 53, 131
Footing, 1, 5, 131
Foundation, 131
Frieze, 2, 9, 13, 131

G

Gable, 3, 131
Gambrel roof, 131
Geometrical problems, 15
Gothic Style, 131
Grange, 131
Greek moldings, 3, 17
Groin arch, 131
Grouped columns, 131
Guttæ, 49

H

Height of an arch, 131
Helix, 132
Hip roof, 132
Hips, 132
Hollow, 3, 23
Hyperbola, 15

I

Imposts, 111, 132
  Composite, 113
  Corinthian, 113
  Doric, 49, 113
  Ionic, 113
  Tuscan, 113
In antis, 132
Intercolumniation, 103, 105, 132
Interlaced arches, 132
Intrados, 2, 13, 132
Ionic Order, 55, 56, 57, 59, 61, 132

K

Keystone, 132

L

Lip mold, 132
Listel, 3, 23, 132
Lombard Architecture, 132

M

Mansard roof, 132
Mausoleum, 132
Members, 132
Merlon, 132
Metope, 132
Minute, 132
Modillions, 25, 37, 132
  Composite Order, 25, 29
  Corinthian Order, 25, 29, 77
Module, 132
Molding, 21, 23, 133
Monotriglyph, 133
Mouth, 3
Mullion, 133
Munion, 133
Mutule, 51, 133

N

Necking, 133

O

Obelisk, 133
Octostyle, 133
Orders of Architecture, 2, 3, 133
Orthostyle, 133
Ovolo mold, 2, 3, 17, 134

P

Parabola, 15
Parapets, 1, 9, 95, 97, 134
Parthenon, 2, 51
Pedestal, 9, 91, 93, 97, 134
Pediments, 99, 101, 134
Pendent, 134
Pendent posts, 134
Pendentive, 134
Pendentive bracketing, 134
Pent roof, 134
Pentastyle, 134
Peristyle, 134
Perpendicular Style, 134
Pier, 1, 9
Pilasters, 75, 107, 109, 134
Pillar, 135
Planceer, 135
Plinth, 135
Polytriglyph, 135
Post, 1, 9
Prostyle, 135
Pyramid, of Cephren, 121
  of Cheops, 121
  of Mycerinos, 121
Pyramids, 121–123

Q

Quarter-round mold, 3, 17, 19
Quirk bead mold, 23
Quirk cyma mold, 23
Quirk molding, 135
Quoins, 135

R

Rafters, 135
Reeding, 23
Ridges, 135
Ridge-pole, 135
Rilievo, 135
Roman moldings, 3, 19
Roofing, 135
Roofs, 135
  curved, 1
  flat, 1
  gables, 1, 5
  hips, 1, 5
  horizontal valley, 1, 5
  lean-to, 1
  ridge, 1, 5
  sloping, 1
  valleys, 1, 5

S

Scotia molding, 3, 17, 19, 23, 136
Scrolls, 26, 33
Shaft, 1, 9
Sharp molding, 23
Soffit, 2, 9, 49, 136
Spandrel, 2
Sphinx, 121
Spiral, 15
Splay face, 23
Square molding, 3
Stereobate, 136
Straight arch, 136
Style, 136
Stylobate, 136
Sunk fillet, 23
Superposition, 87, 89
Surbase, 136
Systyle, 136

T

Tænia, Doric, 26, 31
  Tuscan, 26, 31
Tetrastyle, 136
Tholobate, 136
Three-quarter-round molding, 23
Thumb, 23
Tore, 3
Torus molding, 3, 17, 19, 23
Triglyph, 136
Trochilus, 3
Tuscan Order, 3, 41, 43, 136
Tympanum, 101

V

Vault, 2, 136
Volute, 26, 35, 59, 136